THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXVIII. No. 699.] LONDON, OCTOBER 3, 1876. [28TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—12,000 cubic feet of gas per ton of coal; 28-candle gas; coke 66·70 per cent.; volatile matters 33·30 per cent. Coke of good quality.

RAMSAY'S PATENT CONDENSED GARESFIELD COKE.

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GAS-RETORTS, introduced 1838. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.

Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne.

Address G. H. RAMSAY, NEWCASTLE-ON-TYNE.

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GENUINE TORBAY PAINT
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SPECIAL GASOMETER PAINT
(Mixed ready for use).

These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.

They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.

The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.

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(SUCCESSORS TO SAMUEL CALLEY. ESTABLISHED 20 YEARS.)
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WORKS: BRIXHAM, TORBAY.

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MANUFACTURER OF
WOOD GRIDS
FOR
SCRUBBERS
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PURIFIERS.

BROOKFIELD IRON-WORKS,
103, ICKNIELD STREET EAST,
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COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,

Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and other OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."

J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.

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THE ALMA WORKS, WALSALL,
Established at the commencement of Gas Lighting.

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35, 36, 37, & 39, GRANBY ROW, MANCHESTER.

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J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.

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WET AND DRY GAS-METERS,
OF
FIRST-CLASS MATERIALS & WORKMANSHIP;
ALSO, STATION-METERS, PRESSURE-GAUGES, STREET-LAMPS, REGULATORS, &c.

ESTABLISHED 1830.

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MANUFACTURERS OF
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CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
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RETORT-SETTING A SPÉCIALITÉ.

RETORTS SET, AND GUARANTEED TO BURN OFF A CERTAIN AMOUNT OF COAL OR ELSE NO MONEY TAKEN FOR THE CONTRACT.

PLANS ON APPLICATION.
Retort-Setters sent to all parts of Europe and America
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DUKE OF HAMILTON'S
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NATIONAL STANDARD GASOMETERS

FOR THE ENGLISH GOVERNMENT
AND FOR THE GOVERNMENT OF THE NETHERLANDS
AND OF THE DUPLICATE COPY
Presented by Her Majesty's Government to the French Government,
AND MANUFACTURERS OF

IMPROVED DRY GAS-METERS

Warranted to Measure correctly & not to vary.

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SILVER MEDAL, PARIS EXHIBITION, 1867.

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AND

LAP-WELDED IRON AND HOMOGENEOUS METAL BOILER TUBES.

Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools.

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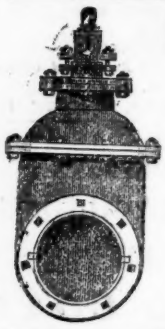
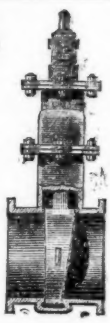
WELLINGTON TUBE-WORKS, TIPTON, STAFFORDSHIRE,

MANUFACTURER OF

EVERY DESCRIPTION OF TUBING, GAS, STEAM, HYDRAULIC TUBES AND FITTINGS,
EITHER BLACK, GALVANIZED, OR ENAMELLED HOT WATER TUBES AND FITTINGS,
CORE BARS, COILS, COCKS (IRON OR BRASS),
CHANDELIERS, &c., GAS-FITTERS' TOOLS, GAS TONGS, STOCKS, TAPS, DIES, &c., &c.,
HANDRAIL TUBINGS, IRON AND BRASS, PLAIN OR TWISTED,
TELEGRAPH TUBES OR POLES, &c., &c.



C. & W. WALKERS' DOUBLE-FACED GAS-VALVES.



These solidly constructed double-faced Gas-Valves have taken the place of the old system of the light, single-faced disc, which is too uncertain and unreliable in large bores.

They are guaranteed absolutely gas-tight. They are very massive and rigid, and by improved modes of manufacture they are produced at very little excess in cost over the old light, weak system, which is liable to spring and bend, and become leaky.

The Valve is a rigid wedge of solid cast iron, having two perfectly scraped surfaced facings fitting between the two on the body, which are also surfaced.

A spring in two short halves, and, therefore, not liable to break, is used only for scraping the front facing clean.

The front facing is vertical; the back facing forms the wedge.

At a slight additional expense both flanges are faced to bolt to main-pipes.

MIDLAND IRON-WORKS,

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THE LANCASHIRE GAS-METER COMPANY,

LIMITED,

FALCON METER-WORKS, OLDHAM,

MANUFACTURERS OF

WET & DRY GAS-METERS, GOVERNORS, PRESSURE & EXHAUST REGISTERS,

&c., &c.

STREET-LAMP METERS in CAST-IRON CASES.

LAMP COCKS AND BRASS FINISHING IN ALL ITS BRANCHES.

TRADE MARK

THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

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WAREHOUSE: SOUTHWARK STREET, LONDON.

JAMES RUSSELL & SONS, LIMITED,

PATENTEES & FIRST MAKERS OF WROUGHT-IRON TUBES,

ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

MANUFACTURERS OF

TUBES and FITTINGS for GAS, STEAM, and WATER;
LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;
HYDRAULIC TUBES, BEDSTEAD TUBES, WELL TUBES, TELEGRAPH POSTS, COILS, &c.;
GAS-FITTERS TOOLS, VALVES, COCKS, &c.

THOMAS PIGGOTT & CO.,

(Established 1822,)

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MANUFACTURERS OF

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CAST & WROUGHT IRON TANKS FOR DITTO;

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

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GAS PURIFICATION & CHEMICAL Co., LIMITED.

(Successors to JOHN WILLIAM O'NEILL & CO.,)

Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

JOHN WILLIAM O'NEILL, SAMUEL H. JOHNSON, } Joint Managing Directors.

WHITAKER'S
PATENT RETORT CHARGING APPARATUS

(NOW AT WORK AT WAKEFIELD GAS-WORKS)

Effects a Great Saving in Labour, estimated at about £2 per Mouthpiece per Annum; Renders Gas Companies less Dependent on Skilled Stokers; Makes a Charge Evenly and Quickly, and Prevents Waste of Gas; and can be Supplied and Erected at £2 10s. per Mouthpiece, including Royalty.

FOR FURTHER PARTICULARS, APPLY TO THE SOLE LICENSEE,

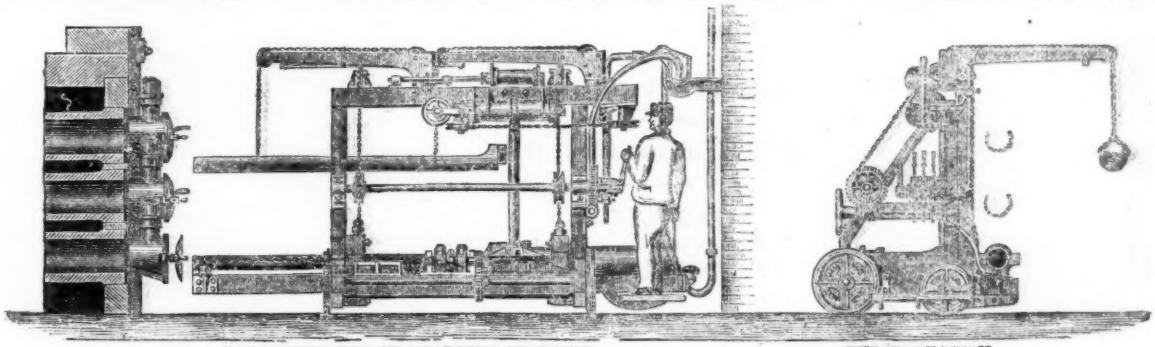
EDMUND ROBINSON,

CITY BUILDINGS, CORPORATION STREET, MANCHESTER,

WHERE A WORKING MODEL MAY BE SEEN.

N.B.—*The above Advertisement will appear in the first* JOURNAL OF GAS LIGHTING *in each Month.*

FOULIS'S PATENT STOKING MACHINE.



SIDE ELEVATION OF CHARGING MACHINE. END ELEVATION

(*The Drawing Machine will be Illustrated in next week's Advertisement.*)

Makers: TANGYE BROTHERS and HOLMAN, London and Birmingham; ADAM WOODWARD and SON, Manchester; ROBERT LAIDLAW and SON, Glasgow; MASCHINENBAU-ACTIEN-GESELLSCHAFT HUMBOLDT, Kalk bei Deutz; Or all particulars may be had from JAMES WOTHERSPOON, 31, St. Vincent Place, Glasgow.

THE

IMPERIAL METER COMPANY,

LIMITED,

KING'S ROAD, LONDON, N.W.,

OFFICE: 115, VICTORIA STREET, WESTMINSTER, S.W.,

MANUFACTURERS OF

"WET" & "DRY" GAS-METERS IN IRON & TIN-PLATE CASES,

STATION-METERS AND GOVERNORS, STREET-LAMP METERS, BOXES, AND REGULATORS FOR THE AVERAGE METER SYSTEM.

Attention is called to their Dry Meters in Wood Cases, as used by the principal London Gas Companies. These Meters are especially suitable for seaport towns and for export.

The Company repair or convert every description of Wet Gas-Meters to De Castro and Burton's Patent.

HODGE & CO.'S

IMPROVED VENTILATING SUN-LIGHTS

WITH TALC REFLECTORS AND SELF-ACTING VALVES TO PREVENT DOWN-DRAUGHT;

VENTILATING GLOBE LIGHTS for DINING-ROOMS, LIBRARIES, &c.

Ormolu, Bronze, & Crystal Gaseliers;

MEDIÆVAL CHURCH WORK AND CORONÆ

COCKS, VALVES, and FITTINGS for GAS, STEAM, and WATER;

COLUMNS, BRACKETS, & STREET LANTERNS;

BLACK AND GALVANIZED BARREL COMPO AND TIN PIPE.

GAS ENGINEERS,

100, HATTON GARDEN, LONDON.

Drawings and Prices upon application.

JOHN WRIGHT AND CO., ESSEX WORKS, BIRMINGHAM,

Beg to call the attention of MANAGERS and DIRECTORS of GAS COMPANIES to the following letter which they have lately received.

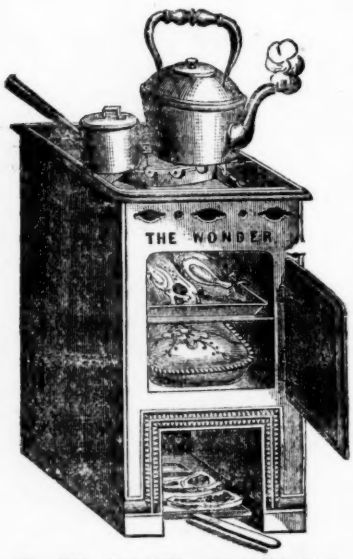
COPY OF LETTER RECEIVED FROM MAGNUS OHREN, Esq.

Crystal Palace District Gas Company, Lower Sydenham, S.E.

To Messrs. John Wright and Co., Essex Works, Birmingham.

Dear Sirs,—In reply to your inquiries, I am glad to state that the use of GAS COOKING AND HEATING STOVES has been a complete success here. We have several hundred in use in our districts. We also find it advantageous to let out Stoves at a small rental. We have now 275 Stoves at rent.

The Stoves you make I can with confidence recommend, having so many in use, and giving satisfaction. I need scarcely point out to you the advantage to Gas Companies to recommend the use of Gas Stoves to their Gas Consumers, even where they do not supply them on sale or rent, as the use of Gas Stoves brings day consumption, and thus the Company make a profit by day as well as by night.—I am, dear sirs, yours faithfully, MAGNUS OHREN.



Size, 25½ in. high; 14 in. wide; 12½ in. back to front.

Price 50s., complete with Pan and Gridiron.

GAS HEATING STOVES

(TERRA COTTA AND IRON).

THE CHEERFUL STOVE.

COOKING STOVES.

BREAKFAST COOKERS.

BATHS HEATED by GAS

GAS STOVES

For Boiling, Broiling, Preserving, Heating Flat Irons, and for all other Domestic Purposes.

Gas Companies and the Trade who have not our Illustrated Catalogue are respectfully requested to apply for same.

A LIBERAL DISCOUNT to the TRADE.

No. 4003.

THE CHEERFUL GAS STOVE, with Copper Reflector,

Has all the appearance of a Bright Fire.

PRICE from 32s.

W. & B. COWAN,

(ESTABLISHED 1827,)

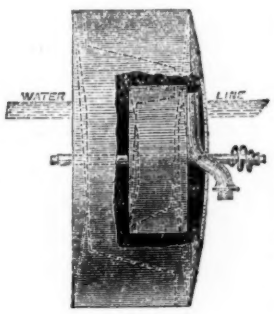
WET & DRY GAS-METER MANUFACTURERS,

CHURCH STREET,
MILLBANK STREET,
(NEAR THE HOUSES OF PARLIAMENT.) **LONDON, S.W.**

BUCCLEUCH ST. WORKS,
EDINBURGH.

From "THE JOURNAL OF GAS LIGHTING," Jan. 5, 1875.

"The changes effected in the construction of the wet meter are such that it now occupies a position which it never held before—that of an unvarying measure. . . . Both company and consumer are now equally protected, perfect accuracy of measurement is obtained, and that, too, without the least increase of mechanism, or the action of the meter in the least degree being prejudicially affected."



BRITISH ASSOCIATION of GAS MANAGERS, Leeds, 1875.

Inaugural Address of the President, JAMES PATERSON, Esq., F.G.S., of Warrington.

"There are, however, degrees of what may properly be termed excellence; and this leads me to notice one of the most beautiful applications which science has yet devised in the construction of the meter, and which has rendered it an absolutely reliable and unvarying instrument. . . . The object aimed at, and most admirably accomplished, is to change the varying measurement of a varying water-line to an unvarying measure with a varying water-line and annulus."

WARNER & COWAN'S
PATENT
"SELF-REGULATING DRUM" GAS-METER.

It is the ONLY Meter in which reliance can be placed.

It is the ONLY Meter in which the DRUM or WHEEL has been improved since it left the hands of Clegg and Crosley.

It is the ONLY Meter that POSSESSES AN UNVARYING MEASURING-CHAMBER.

It is the ONLY Meter FREE FROM delicate and complex compensating arrangements for maintaining water-line.

W. & B. COWAN,

(ESTABLISHED 1827,)

CHURCH STREET,
MILLBANK STREET,
(NEAR THE HOUSES OF PARLIAMENT.) **LONDON, S.W.**

BUCCLEUCH ST. WORKS,
EDINBURGH.

W. & B. COWAN'S large and increasing Export Trade is provided for by their keeping constantly on hand a very large stock of both Wet and Dry Meters, ready for immediate despatch to the British Colonies and Foreign Countries.

HOPKINS, GILKES, & CO.,
LIMITED,
MIDDLESBOROUGH,
SUPPLY GAS & WATER PIPES of EVERY SIZE.
Plain, Turned and Bored, and Coated.
CAST-IRON RETORTS.
Castings for Gas-Works of every description.
EXHAUSTERS.
LONDON OFFICE: 25, LAURENCE POUNTNEY LANE.

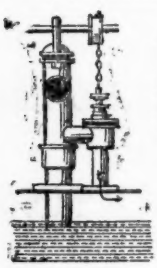
INTERNATIONAL EXHIBITION, 1862.
CLASS X.
PRIZE MEDAL
For excellence of Fire-Clay Gas Retorts, and
"HONOURABLE MENTION" for
good quality of Fire-Bricks.
WILLIAM STEPHENSON & SONS,
THROCKLEY,
NEWCASTLE-ON-TYNE.

BELGIAN CLAY RETORTS.
J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.
Communications addressed to J. SUGG & CO., GHENT, will receive immediate attention.

FIRE-CLAY RETORTS.
WILLIAM FRASER,
INVERKEITHING,
Owner of the Works at which Fire-Clay Retorts were first made), can supply
RETORTS, FIRE-BRICKS, &c.,
to any extent.
References can be given to managers of above a hundred Gas-Works whom he supplies.
He ships at Charlestown his
CELEBRATED HALBEATH STEAM COALS,
on Navy List.

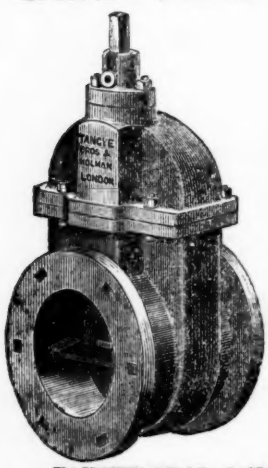
JAMES NEWTON & SONS,
(Established 1820,)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.,
DEPÔT for STOURBRIDGE AND NEWCASTLE
FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY,
and every Article suitable for
GAS AND WATER WORKS.

COPP'S PATENT ANTI-DIP GAS APPARATUS.



Produces from 10 to 20 per cent. more gas of higher illuminating power.
Prevents the deposit of carbon.
Retorts last much longer.
Charges work off quicker.
This simple invention has been in use in many works for the last six months, with the above results.
PRICE 2 GUINEAS EACH.
Testimonials and particulars on application.
Address WALTER L. COPP, WATCHET, SOMERSET.

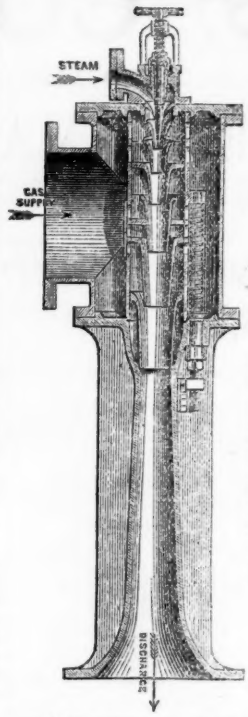
IMPROVED
GAS-VALVES.



SIZES AND REDUCED PRICES ON APPLICATION.

TANGYE BROS. & HOLMAN,
LAURENCE POUNTNEY LANE,
LONDON.

KÖRTING BROS.,
Steam-Jet Engineers,
7 and 17, LANCASTER AVENUE,
MANCHESTER.
Germany: Cellerstr. 35, Hannover. Austria: Kolring., Pestalozzigasse 6, Vienna.
France: 11, Rue Louis-le-Grand, Paris. U. S.: 1645, N. 10th St., Philadelphia.



E. KÖRTING'S PATENT
STEAM-JET GAS-EXHAUSTER.
IMPROVED CLELAND'S PATENT.
Small Cost—Compactness—Perfectly Self-Acting—
Self-Regulating—Self-Cleansing—No Steam-Engine—No Attention—
No Extra Room Required—No Wear and Tear—No Noise—
No Oscillation in Vacuum, or Back Pressure.
UPWARDS OF 200 IN USE.
SUPPLIED TO—

Chartered Gas Co.	Glasgow Corporation.	Hanna, Donald, and Wilson, London.
London Gas Co.	Leyland Gas Co.	Ratcliff Gas-Works.
S. Metropolitan Gas Co.	Stalybridge Gas-Works.	Kendal Gas-Works.
Phœnix Gas Co.	Lincoln Gas-Works.	Longton Gas Co.
Liverpool Gas Co.	Birmingham Gas-Works.	Dartford Gas Co.
Bolton Corporation.	Wakefield Gas-Works.	Exeter Gas Co.
Horsham Gas Co.	Brentford Gas-Works.	Harrogate Gas Co.
Epsom and Ewell Gas Co.	Burnley Gas-Works.	Hertford Gas Co.
Ipswich Gas Co.	Guildford Gas-Works.	Watersside Gas-Works, Todmorden.
Cheltenham Gas Co.	Gloucester Gas-Works.	F. W. Grafton and Co., Accrington.
Sandwich Gas Co.	Kirkintilloch Gas-Wks.	
Cornholme Dis. Gas-Wks.	Nantwich Gas-Works.	
Bury Gas-Works.	Enniskillen Gas-Works.	
	&c., &c., &c.	

E. KÖRTING'S PATENT STEAM-JET REVIVIFYING BLOWERS FOR THE PURIFYING MATERIAL.

SOLE LICENSEES FOR
W. CLELAND'S PATENT STEAM SCRUBBER,
Combining small cost and thorough efficiency, with absence of any mechanical means and necessity of renewing the scrubbing material.

FOR PARTICULARS, APPLY TO
KÖRTING BROS., 7 and 17, Lancaster Avenue,
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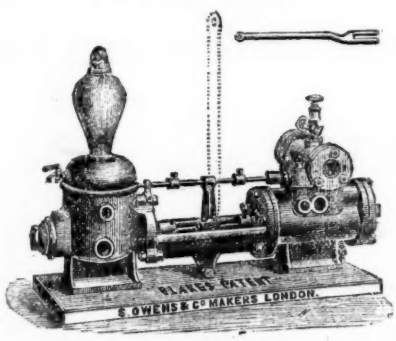
OR TO
GERALD J. TUPP, 8, John Street, Adelphi, W.C.,
LONDON,
SOLE AGENT FOR ENGLAND AND WALES.

S. OWENS & CO.,
WHITEFRIARS STREET, LONDON, E.C.,
HYDRAULIC ENGINEERS,
AND MANUFACTURERS OF
PUMPING MACHINERY of every Description.
SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF
BLAKE'S PATENT STEAM-PUMPS,
More than 8000 in use,
ESPECIALLY ADAPTED FOR USE IN GAS AND CHEMICAL WORKS, FOR PUMPING TAR, WATER, AMMONIACAL LIQUOR, ACIDS, &c.
The following are some of the prominent advantages of the BLAKE PUMP:—

It will start at any point of stroke.
It has no dead point.
It works fast or slow, with the same certainty of action.
It is economical. Has a lead on the slide-valve.
It is compact and durable.



It is interchangeable in all its working parts.
It will deliver more water than any other pump.
It is made of best materials in the most workmanlike manner.
Can be worked at 20 strokes per hour, or 200 strokes per minute.

This Illustration represents Boiler-Feed Pumps, Sizes Nos. 1, 2, and 3, with Hand Lever for working Pump when Steam is not available.

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RETORT-LIDS,

WITH

HOLMAN'S NEW PATENT

BRACKETED CROSS-BARS,

ANTI-FRICTION CATCHES, AND ECCENTRIC FASTENINGS.

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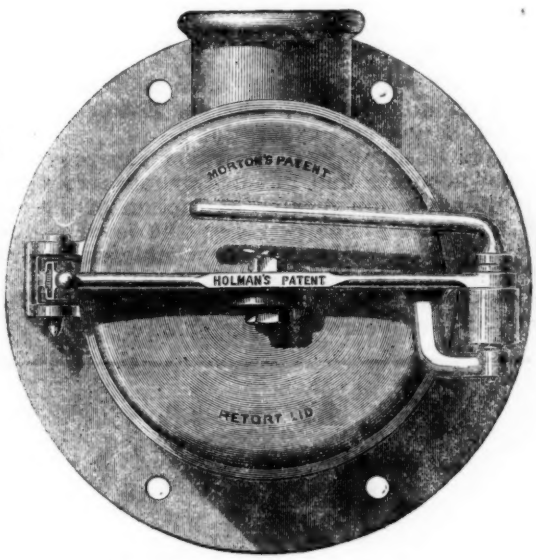

HOLMAN'S NEW SELF-SUSTAINING CROSS-BAR ENSURES FREEDOM OF JOINT, AND MAINTAINS PARALLEL POSITION OF THE LIDS.

By the employment of MORTON'S PATENT SELF-SEALING RETORT-LIDS, with HOLMAN'S PATENT ECCENTRIC FASTENINGS, the old-fashioned, cumbersome, and expensive method of sealing Retorts, by luting the lids with lime and other materials, is entirely dispensed with.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested, over 20,000 being in use at various Gas-Works in London and the Provinces, among which may be mentioned:—

The Gaslight Co., Beckton (where nearly 4000 are in use).
" Gaslight Co., Bow Common.
" Gaslight Co., Silvertown.
" Gaslight Co., Lupus Street.
" London Gaslight Co.
" Independent do.
" Phœnix do.
" South Metropolitan Gaslight Co.
" Commercial do.
" Imperial do.
" West Ham Gas Co.
" Gas-Works, Barnet.

The Gas-Works, Royal Arsenal, Woolwich.
" do. Lower Sydenham.
" do. Brentford.
" Consumers Gas Co., Woolwich.
" Alliance and Dublin Gas-Works.
" Edinburgh do.
" Manchester Corporation do.
" Salford do. do.
" Rochdale do. do.
" Liverpool Gas-Works.
" Birmingham do.
" Birkenhead do.
" Nottingham do.

The Newcastle-on-Tyne Gas-Works.
" Lurgan do.
" Carmarthen Gas-Works.
" Merthyr Tydfil do.
" Windsor do.
" Leeds do.
" St. Albans do.
" Over Darwen do.
" Rotherham do.
" Aylesbury do.
" Bournemouth do.
" Ystrad do.
" Cardiff do.
" Rochester do.

The Keighley Gas-Works.
" Aberdare do.
" Ballymena do.
" Richmond do.
" Stalybridge do.
" Longton do.
" Exeter do.
" Ross do.
" Falmouth do.
" Barrow-in-Furness do.
" Belfast do.
" Wakefield do.
And other Provincial and Foreign Gas-Works.

IMPORTANT TESTIMONIAL.

The Gaslight and Coke Company (Commonly called the Chartered Gas Company), Beckton, North Woolwich, July 2, 1874.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—In answer to your inquiry respecting the Self-Sealing Lids, I beg to say that they continue to work well, and I have every reason to be satisfied with them.

I should be very sorry to return to the old system of Luting, and our stokers here freely acknowledge the benefit to them of the new system.

I am, yours truly,
(Signed) G. C. TREWBY.

London 1851. New York, 1853 Paris, 1855. London, 1862.

Dublin, 1865

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

MANUFACTURERS OF PATENT

WET & DRY GAS-METERS,

STATION-METERS WITH PLANED JOINTS,

GOVERNORS, PRESSURE REGISTERS, GAUGES,

AND EXPERIMENTAL APPARATUS,

STREET-LAMP METERS,

AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

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PRELIMINARY ANNOUNCEMENT OF THE PUBLICATION IN MONTHLY PARTS OF

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

The Publisher of the JOURNAL OF GAS LIGHTING, *&c., has much pleasure in announcing that he has in course of preparation, and will shortly commence the issue, in monthly parts, of the "Treatise on the Manufacture and Distribution of Coal Gas."*

From the first appearance of these papers in the pages of the JOURNAL, *an earnest wish was expressed that, as soon as possible, they might be re-published in a separate form, and every subsequent week has brought communications to the Publisher, from various parts of the world, in which this desire has been repeated.*

The present advanced state of the work warrants the Publisher in notifying its speedy reproduction, in a serial form, with all the original, and many new, drawings and plans.

In this Edition of the "Treatise" every portion will be carefully revised, many parts will be entirely re-written, numerous additions will be made in each section, and some alterations will be carried out in the general arrangement.

The work will be printed in clear, bold type, on superior paper, and of a size which will admit of the introduction of numerous full-page and other engravings of works, plant, and apparatus.

The "Treatise" will be published monthly, in a coloured wrapper, at the price of 1*s. per number.*

It is expected the first number will be ready for delivery at the end of this month, and in the meantime the Publisher cordially invites suggestions from Subscribers and others, with the view of making the new publication as complete as possible.

11, *Bolt Court, Fleet Street, E.C., Oct.* 3, 1876.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, OCTOBER 3, 1876.

Circular to Gas Companies.

THE *Times*, a journal which has been considered the most influential defender of the rights of commercial enterprise, a few days ago devoted an article to the justification of what we call the confiscation of gas and water undertakings by local authorities. Taking the case of the Stockton and Middlesbrough Water Company as a text, the writer points out, with evident satisfaction, that the success of the Bill of the Corporations is an indication "that Parliament has become more favourable to the "transfer of such public duties" (as the supply of gas and water) "to public hands." We are by no means sure that this is an actual fact.

There are, in both Houses of Parliament, those who advocate transfer, and there are those also who resolutely oppose it. The decision of a Committee of either House can, in general, be predicted, when the members are known. Evidence, we all know, has very little weight in a committee-room. It is rarely completely understood by the members, who listen for the most part with undisguised weariness. Some doze through a great part of the sitting. We have even seen a noble member lose his balance, and fall out of his chair, on more than one occasion in the course of an inquiry. It is very tempting, and we have many times thought of sketching the members of a committee—the silent member, who never makes a note or asks a question during an inquiry lasting twenty days—never opens his lips, in fact, except to swallow buns and coffee, or sandwiches and sherry; or that other, who writes private notes all the morning, and dozes the rest of the day. But we need not continue; the opportunity will come again next year. Counsel are perfectly content if the chairman appears to be awake; and the case proceeds, and eventually comes to an end. How the ultimate decision is arrived at, we are unable to say; but we have said enough to indicate our strong opinion that it is in most cases come to, not after a careful weighing of evidence, but is, in general, the result of a foregone conclusion formed by the more influential members of the Committee. For this reason we decline to accept the decision, in the case of Stockton and Middlesbrough, as the final decision of Parliament. It will, of course, be quoted as a precedent, whenever a Bill to effect a compulsory purchase is promoted; but we have still a doubt whether it will be extensively followed.

According to *The Times*, the great sin of the Stockton and Middlesbrough Water Company was, that they went to Parliament in the last session to obtain the reversal of a decision of a committee in the previous session. Now, gas and water companies have succeeded in such an enterprise many times. They have been refused the powers they asked for in one session, and have obtained them in the next. But for that fact, the Stockton and Middlesbrough Company would not have proceeded with their second Bill. The same result will, no doubt, happen again, and it will take the experience of several sessions to convince us, that Parliament has definitely decided to abrogate the principle which has hitherto governed the dealings with commercial undertakings and Corporations. Supposing, however, the opinion of *The Times* to be correct, that a new course of policy has been inaugurated, the importance is extreme. "It is important to companies, and to those "who wish to invest money in company undertakings; it is important to Corporations, which, as sanitary authorities, may wish "to assume the management and control of gas and water in their "districts; but it is, perhaps, of importance to the public at "large." The *perhaps* here is worthy of note. We have a strong opinion that the public at large have never benefited by the transfer of gas and water undertakings to Corporations. The public at large are as well served by Companies as by Corporations, and, in many cases, very much better, and even cheaper. To the investing part of the public, the general transference of undertakings would entail important consequences. There is always a lack of sound and safe investments in this country, and hence the large transactions in swindling foreign loans.

To Corporations, the precedent may or may not be important. It cannot, we are afraid, be disguised, that, in most cases, the desire of Corporations to acquire gas undertakings is engendered by personal jealousies. Gas directors and shareholders are often found in Town Councils, mostly in a minority, while the majority of frothy orators, who keep their seats by the power of jaw, never possess a gas share. A vicious antagonism is thus brought

about, which begins by harassing a company, and sometimes ends in a transfer, with results that our columns often record. We shall have one to refer to further on.

It is, of course, a question, how far the cupidity of Corporations will be stimulated by the precedent established in the Stockton and Middlesbrough case. While waiting in the lobby for the decision of the Commons Committee, we heard an agent of the Corporations remark: "If we get our Bill, all the Corporations "in the kingdom will come to Parliament next year." At present, however, there are few signs of movement. So far as we know to-day, Blackburn is the only town that will seek to effect a compulsory purchase next session. There is but little time now left for the necessary forms to be gone through, and we scarcely expect to hear of any other case. There may be, and it is likely there will be, others presently; but, in the meantime, we are not frightened. We are ignorant of the case that will be presented against the gas company by the Blackburn Corporation, and equally in ignorance of the defence the company can make. A knowledge of both cases would not help us in guessing at the probable result of the contest. As we said before, the personal opinions or prejudices of the members of the committee always settle such questions.

Mr. Farrer, we are sorry to see, is still writing letters. He has recently addressed another to the Metropolitan Board, with what object it is not easy to discern. We have not the letter before us; but, according to the reporter's abstract, Mr. Farrer approves of the action taken by the Metropolitan Board on the gas question last session—although it seems to us that it was not exactly what the Board of Trade wished—and then he goes on to express an opinion, that the auction clauses, coupled with the sliding scale, will, no doubt, result in a great advantage to consumers. In the course of time we shall see.

The report of the directors, and the accounts of the Commercial Gas Company, for the past half year, have been issued. We have now, for the first time, the combined accounts of the Commercial and the Ratcliff Companies, and the latter will no longer require mention. The report of the directors is, as usual, exceedingly brief, and the most noticeable feature in the accounts is, that the profits earned in the half year, with gas at 3s. 9d. per 1000 feet, are just about sufficient to pay the dividends. On looking through the items, it would appear that amalgamation has not in this case resulted in any economy of management. On the contrary, a comparison of these accounts with those of the separate companies, for a corresponding period, shows a noticeable increase in the cost. This increase, we may mention, is most remarkable in the amount of the directors fees, which now amount to much more than was paid to the separate Boards. Coals look to us very dear, when calculated according to the make of gas; but then it is most likely that more than the quantity carbonized in the half year have been paid for. Still it does seem odd that, with coals at present rates, an excellent sale of residuals, and gas at 3s. 9d., the company can only just make both ends meet. Clearly, there is no expectation of a reduction of price for the East Londoners, nor can the shareholders hope for any advantage from the sliding scale.

We have, also, the report and accounts of the South Metropolitan Company, which are as favourable as usual. Although the price charged for gas during the half year was only 3s. per 1000 feet, the balance carried to net revenue account is more than sufficient to pay a full dividend. The report of the directors clearly explains the position the company are placed in under the Act recently passed, and no doubt is insinuated that the new legislation will prove otherwise than beneficial. We believe that, in the absence of another large increase in the price of coal, it will be advantageous to the interests of the shareholders; and the interval of three or four years, which may elapse before another great rise takes place, will be well occupied in adding to the reserve-fund, which, as the report states, will, under the last Act, become the absolute property of the shareholders. Large additions to the present works are now in course of construction; but, as the company have still £70,000 to call up, it will be some time before the auction clauses come into operation. The report makes no mention of the wise step the directors have taken in raising the price of gas and charging meter-rents, but on this matter something will, no doubt, be said at the meeting. We shall defer further remarks until this has come off, but may, in the meantime, heartily congratulate the company on their continued success.

The accounts of the Surrey Consumers Gas Company necessarily show a very satisfactory state of affairs, from a shareholder's point of view. The balance of net revenue or profit for the past half year amounts to £17,502, while the sum required for a full dividend is £11,500. Including the balances, it would appear that there is £21,259 available for the payment of the dividend above named. At present the company charge 4s. per 1000 feet for gas; but the above statement of accounts shows that some reduction will soon be possible. With a balance in hand nearly equal to half a year's dividend, it will be good policy for the directors to take the claims of consumers into consideration. We throw out the hint in the hope that it may be accepted in the spirit it is given. The directors know their own business best, but in these critical times they cannot shut their eyes to the advantage of selling gas as cheaply as possible.

From none of the reports of the southern companies we have before us, do we gather any notion of the opinions of the directors as to the future policy of the companies. Amalgamation, we understand, is still on the cards, but which is to take the lead? "Under which King Bezonian?" That seems to be the question. It may be a knotty one, but the southern companies can hardly have a difficulty in solving it.

We report, in another column, an interesting discussion which took place in the Town Council of Huddersfield on a motion to reduce the price of gas. The Corporation bought the undertaking in 1872, and so came immediately upon bad times; but the management has been good, and the works have turned out profitable. It has now become a question, which was practically discussed the other day: To whom shall the undertaking be profitable—to the gas consumer or the ratepayer? In other words: Shall surplus profits be applied in reduction of price or in aid of rates? The injustice of the latter course was, we think, made abundantly clear at the meeting we report. If followed, the gas consumer would be taxed in order that large ratepayers who consumed no gas might be relieved of a part of their burden. Most certainly the undertaking should be made to yield some surplus profit. There should be a depreciation-fund, of which we see no mention; and the works ought to be insured. But when these have been provided, the profits should be kept at a minimum. The Council can always raise the price of gas in case of necessity, and we are glad to see that they neglect no opportunity of making reductions. It is a pity that all Corporation gas undertakings are not managed like that at Huddersfield.

Our readers know that, some months ago, the Government appointed a Commission to inquire into the nature and management of corporate property in Ireland. The Commissioners have, very properly, commenced their inquiries at Limerick, the Corporation of which city are sufficiently notorious for their flagrant dealings with corporate property and public funds. We incidentally exposed some of their doings a year and a half ago, and need not again trouble ourselves with anything but their management of the gas undertaking.

Although the case cannot be paralleled in the United Kingdom, the story may as well be told, to show what corporate management may possibly be, when the general body of ratepayers take no interest in their affairs. It would seem that, in 1856, the Town Council purchased, for £10,000, the undertaking of a Citizens Consumers Gas Company, which had been started to compete with the United General Company. The undertaking had proved a failure in the hands of the company, and it would appear that something like a conspiracy was entered into, to foist the "rickety, worn-out, and insolvent concern"—as it was described by a very candid witness—upon the citizens and ratepayers of Limerick. Willing tools, and, perhaps, some directly interested, were found in the Council, and, as we have said, the purchase was made. The undertaking turned out as unprofitable to the Corporation as to the company, and the original debt of £10,000 has been increased to about £32,000, the additions having been made without the sanction of any authority. The report is not so clear as we could wish; but it would appear that the concern was managed at first by a Gas Committee, who drew cheques at their pleasure, their proceedings being always approved by the Council. Subsequently, a single manager was appointed from among their own body. It would seem that the gas accounts have never, from the first, been properly audited, and, like a spendthrift, all the Corporation know of their gas affairs is the claims of their creditors. We need not pursue the story, which our readers can see for themselves.

The Town Council of Lichfield have resolved on applying for a Provisional Order, empowering them to carry out their agreement for the purchase of the gas undertaking. They would have done better to go for a special Act, but it does not very much matter. Lichfield, like most cathedral towns, is in a state of stagnation, and much development is improbable. As regards the interest to be paid on the purchase-money, supposing the company agree to accept annuities or debentures in lieu of a lump sum, it seems to us that four and three-quarters per cent. is little enough. The Corporation could not borrow the sum for much, if anything, less.

The property-owners of Warrington have held a meeting, and, without positively asserting an opinion that the terms arranged between the Town Council and the Company for the purchase of the gas undertaking, were unreasonable and extravagant, passed a resolution declaring that more precise information, as to the past profits and prospects of the concern, should be furnished to the

ratepayers before the bargain was completed. The opportunity of imparting this will occur when the town's meeting, necessary under the Borough Funds Act, is held. We believe it can be shown that the undertaking is cheap at the prices agreed upon, which brings the cost to about the same as that paid at Huddersfield. The bonus which the shareholders will receive, if they commute their annuities at twenty-four years purchase within the next year, is perfectly reasonable, and it will be an advantage to the Corporation to pay them off as quickly as possible.

We report the proceedings at a meeting of the Dumfries Town Council, convened to take the preliminary step for the adoption of the Burghs Gas Supply (Scotland) Act. No doubt the Gas Company regret that they had not provided themselves with statutory powers, but we see nothing in the proceedings indicating that the Council are acting towards the Company in a directly hostile spirit. We look forward to the further proceedings in the case with much interest, for we shall learn whether the Act will facilitate the fair purchase, or the confiscation, of the unincorporated Scottish gas companies.

Water and Sanitary Notes.

Lord Camperdown is about to attempt the reform of the Metropolitan Board of Works. In the next session of Parliament, he will bring in a Bill, providing that the members of the Board shall be elected by the ratepayers, on the same plan as the members of the School Board are now selected, and not, for the future, be nominated by the Vestries and District Boards. In this enterprise he will find many allies on both sides of the two Houses, and we wish him all success. He ought to receive the hearty support of the members of the Board themselves, but we fear he will not. We shall see.

A curious document has been issued by that peculiar body known as the Society of Arts. The secretary has sent a communication to the London newspapers, inviting complaints of defects of house drainage, and in the connexions of drains with sewers. In this way the small knot of schemers who meet in the Adelphi are endeavouring to back up H. Cole, C.B., whose misrepresentations of the sanitary condition of Kensington have been so fully exposed. We sincerely hope that the householders of the Metropolis will take no notice of this communication.

The purification of the Clyde is of scarcely less importance than the purification of the Thames, and we are glad to see that a movement is in progress which promises to lead to a desirable result. A meeting of the representatives of the local authorities of the towns and districts which drain into the Clyde and its tributories, was held in Glasgow a few days ago, at which it was resolved to apply to Parliament next session for power to constitute a Sanitary Conservancy Board, who, in accordance with Sir J. Hawkshaw's suggestions, are to deliberate and decide upon the best means of disposing of the sewage of the several localities. It will, after all, be a question whether or not it would be better to adopt at once Sir J. Hawkshaw's alternative scheme, and send the sewage of the whole district out to sea, through a tunnel nineteen miles long, bored through the Whinstone rock. At the present time, however, notwithstanding the urgency of the Rivers Pollution Bill, it is best to deliberate. Irrigation, with the sewage of such a city as Glasgow, is utterly out of the question. It would require, it is said, twenty square miles of land to grow, and all the cattle in the three surrounding counties to eat, the grass grown on the pestilential swamp created. Irrigation, said Mr. Baldwin Latham, at the recent meeting of the British Association, is a most expensive process. The theory of irrigation, said another speaker, is dead and gone—he might have said it was exploded at Mr. Hope's Romford farm. Still, when men deal with the sewage question, their minds should not be clouded with despair. The solution of the difficulty will presently come, and it may be a very simple one.

This is the season of the year when it is usual for attacks to be made on the character of the water supply of our so-called Health Resorts. Hastings was early fixed on for attack, and now Margate has been selected. An analysis of the water supplied in the latter place, which we find published in a contemporary, is of such an extraordinary character, that we feel bound to call the attention of the company to it. The water analyzed is stated to have been drawn at the drinking-fountain on the Fort, and the results are said to have been as follows:—

	Grains per Gall.
Total solid matter	77·90
Loss on ignition (carbonic acid being deducted)	15·94
Chlorine (calculated as chloride of sodium)	43·05
Nitrogen as ammonia	·0030
Nitrogen as albumenoid ammonia	·0200

Hardness before boiling, 26°; ditto after boiling, 12°.

There were traces of suspended matter, and the water, when **warmed**, had an offensive smell and a saline taste.

A microscopical examination showed numerous particles of muscular fibre, some of which were in such a state of preservation as to indicate recent origin, and I found also many perfect animalculæ.

Thousands of Cockneys who have had a pleasant holiday at Margate, and have come home much the better for their outing, will be astonished, when they read this paragraph, to find themselves alive. We wish the chemist who made the above analysis, and found such a loss on ignition, after carbonic acid had been deducted, would tell us what was lost.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

CXI.

Photometry (*continued.*)

The forms of photometer previously described have been almost entirely superseded by that introduced by Bunsen, and subsequently modified by King, Letheby, Church and Mann, and Evans. The original Bunsen photometer, as first brought out by Bunsen and King, differed from all previously contrived photometers in effecting the estimation of comparative intensities by transmitted and reflected light conjointly, instead of, as before, by one of these agencies alone. A circular piece of white paper is saturated with melted paraffin or spermaceti, leaving the central portion of the disc untouched. When a piece of paper so prepared is held between the observer and a source of light, the portion saturated with sperm or paraffin, being more transparent than the central, untouched portion, will appear light, while the centre of the disc appears comparatively dark. If, however, the disc be illuminated from the same side as the observer, the previous conditions are reversed, and the central portion of the paper appears bright, while the transparent part appears comparatively dark. This arises from the fact that the most opaque part of the disc is also that which effects the greatest reflection of light, and appears, therefore, the brightest; whereas the light falling on the more transparent portion is more transmitted and less reflected. Let us suppose, now, that the disc is placed between two sources of light; if it happens to be so placed that each side is lighted with the same intensity, the disc will appear equally bright on each side, and no distinction will be seen between the opaque and the transparent portion. If, however, one light should be more intense than the other in relation to the position of the disc, the central portion of the latter will appear darkest on the side of the weakest light, owing to the reflection of the light of the one side being less than the transmission of light from the other; the opposite side of the disc exhibits a contrary effect, the opaque part appearing brighter than the surrounding portion, owing to the reflection of the light being greater than its transmission. The photometer of Bunsen and King was not only a great improvement over previously constructed photometers in the means of effecting the comparison of light intensities, but likewise in the mechanical details and general arrangement of the instrument. The disc was attached to a holder, which moved at will along a graduated bar, the two lights to be compared being placed, one at each end of the bar. On moving the disc until a position was reached in which the intensities of the two lights appeared equal, the number on the graduated bar at which the disc had been stopped showed at once the degree to which the intensity of the one light exceeded that of the other. Fig. 1 (page 485) shows the general arrangement of the Bunsen and King photometer, applied to testing the illuminating power of coal gas. The total distance from light to light is 100 inches. The disc, D, is moved along by the carriage, F, a small central pointer moving over the graduations of the bar for facility in reading. The screen, E, fits on to the disc, the observations being made through the two holes shown in the diagram; and this, with the governor, N, test-meter, M, and candle-balance, Q, completes the apparatus. The gas was consumed at the rate of 5 feet per hour, from an Argand burner, having 15 holes and a 7-inch chimney, the candle consuming as nearly as possible 120 grains of sperm per hour. The bar is graduated from the centre, taken as the zero point towards each extremity, the indications being up to 36 candles. About the middle of the bar the divisions are comparatively large, permitting the graduations to be made to tenths of a candle. As, however, each end of the bar is approached, the space between the divisions becomes smaller and smaller, until towards the extreme ends whole candles only can be read. From 0 to 9 candles the bar is graduated in tenths, from 9 to 20, the scale is in half candles, and from 20 to 36 in whole candles. The method of graduation is obviously founded on the law of inverse squares, the formula being as follows:—

Let x = the distance from the comparison light (say, a candle) to the point in the bar to be marked with a given number of candles.

Let n = the number of candles.

Then $n + x^2 = (100 - x)^2$, or $nx^2 = (100 - x)^2$.

From this the value of x may be found, thus—

$$x = \frac{100\,(\sqrt{n} - 1)}{n - 1}$$

Let $n = 16$; then,

$$x = \frac{100\,(\sqrt{16} - 1)}{16 - 1} = \frac{100\,(4 - 1)}{16 - 1} = \frac{300}{15} = 20$$

The mark on the bar is, therefore, to be placed at 20 inches from the comparison light, and 80 inches from the gas; and, as the squares

of the respective distances should represent the proportion between the two lights, $20^2 = 400$, and $80^2 = 6400$, $\frac{6400}{400} = 16$, the number of times which the one light exceeds the other in intensity.

The Rev. Mr. Bowditch gives a rule, which may here be quoted, for finding the distance from the candle at which the scale should be marked for any desired number of candles, as follows:—

"Find the square root of the number of candles, and diminish that square root by one. Remove the decimal point two places to the right, if there be decimals, or add two cyphers if there be only integer figures, and divide by the number of candles save one."

"To find the place of 7 candles, $\sqrt{7} = 2{\cdot}6458$; less $1 = 1{\cdot}6458$. Remove decimal point two places $= 164{\cdot}58$. Divide by $7 - 1 = 6$ $= \frac{164{\cdot}58}{6} = 27{\cdot}43$ inches; or the mark for 7 candles must be 27·43 inches from the candle." "The following table gives several points thus found:"—

Number of Candles.	Distance of Division Mark from Candle.
2	41·42 inches.
3	36·61 "
4	33·33 "
5	30·90 "
6	28·99 "
7	27·43 "
8	26·12 "
9	25·00 "
11	20·00 "
25	16·67 "
36	14·28 "

In the Letheby photometer the length of the bar was reduced to 60 inches, the details of construction remaining much the same as in the original of Bunsen and King. The graduations are, of course, correspondingly reduced. To find the point of graduation for any required number of candles, it is only necessary to substitute 60 for 100 in the equation already given in connexion with the original Bunsen and King, and the result will give the distance of the mark from the candle end for the number of candles required. Thus for 16 candles—

$$\frac{60(\sqrt{16}-1)}{16-1} = \frac{60(4-1)}{16-1} = \frac{180}{15} = 12$$

The distance required is, therefore, 12 inches; deduct this number from 60, and there is left 48. The squares of the numbers 12 and 48 are 144 and 2304 respectively, and $\frac{2304}{144} = 16$.

In Church and Mann's photometer, fig. 2, the candle-holder was attached to the same frame which held the disc, the candle being maintained at a constant distance of 10 inches from the disc, and the two travelling together. The advantages of this method are that the candle side of the disc is rendered brighter, and more easily read, and that the graduations of the scale are more open. Against these advantages, the constant shifting of the candle is very objectionable, and in careless hands might lead to serious error; the almost inevitable result of any sudden movement being the production of an abnormal rate of combustion, if not the actual spilling of some of the melted sperm. This objection would be considerably lessened if, as the Rev. Mr. Bowditch has proposed, the candle was enclosed in a blackened box, and the movement controlled by a comparatively slow moving rack-work adjustment. The graduation of the instrument is comparatively simple; and the distance from the gas, representing any number of candles, may be found by simply taking the square root of the figures representing the number of candles required and multiplying by 10. Thus for 16 candles—

$$\sqrt{16} = 4, \text{ and } 4 \times 10 = 40$$

The point required is, therefore, 40 inches from the gas.

In the earlier forms and modifications of the Bunsen photometer, the shifting of the disc was accomplished simply by a sliding piece of metal constructed to loosely fit the top of the bar (represented at F, fig. 1). A great subsequent improvement was the introduction of a small box as a disc-holder, which moved on wheels, running along a projecting ledge at the base of the photometer-bar, and which ledge extended the entire length of the bar. The facility of taking observations has also been much enhanced by the introduction of two small vertical mirrors* arranged at the back of the box, one at each side of the disc, which occupied the centre. The mirrors are arranged at an angle of about 45° with the disc, each side of which can thus be seen simultaneously by an observer stationed in front, and a comparison thus made between the two lights with considerably greater facility than was possible under the old arrangement. This method of construction is now adopted in all modern photometers, two candles being also invariably used for comparison in place of only one, the object being to, as far as possible, reduce the disproportion between the comparison light and that under examination, and also to render the consumption of sperm more regular.

The photometer which, together with the modern 60-inch Letheby, is now in the most general use, is a modification of Bunsen's, known as the "Evans closed Photometer." In all the forms of instrument previously described, it is obvious that it was absolutely necessary, when conducting a photometrical experiment, to carefully exclude all sources of light other than the two whose intensities were being compared. It was thus necessary to operate in a specially prepared room, the interior of which was painted a dead black, and from which all external light was carefully excluded. The Evans Photometer dispenses with all these precautions, and an experiment can be conducted in a room with free access of day or gas light, with perfect facility.

The instrument essentially consists of a long black box, somewhat over 100 inches in length, and made of wood, with the exception of the roof, which is arched, and constructed of thin sheet metal. The wooden part of the box is lined throughout with black velvet, and the whole structure is supported at a convenient height by means of suitable wooden supports at each end; two chimneys are also provided at the extremities, to carry off the heated air and products of combustion. The disc is fixed, and situated exactly in the centre of the box, at a distance of 50 inches from the gas; a piece of glass is let into the front of the box at this point, enabling the observations to be taken. The candles are fixed in a brass holder, which is moved away from or towards the disc by being connected with an endless band working over two pulleys, and actuated by a handle in the centre of the photometer. A longitudinal slot, extending along the bottom of the instrument, allows the candle-holder to travel freely, and at the same time acts as a medium for ventilation, an index-hand attached to the holder moving along the graduated scale. Fig. 3 gives an illustration of this form of photometer, which is now adopted in all the London official gas-testing stations.

In the Church and Mann photometer the distance between the candle and the disc was a fixed quantity of 10 inches; in the Evans photometer the *gas* is fixed at 50 inches from the disc, the *candles* being moveable. The graduated scale is made from each end towards the centre, the method of calculation being as follows:—

Let x = the distance required for one candle.
Let n = the number of candles required.

$$n : 1 :: 50^2 : x^2$$
$$\text{And } nx^2 = 50^2$$
$$x^2 = \frac{50^2}{n}$$

Let $n = 4$; then $x^2 = \frac{50^2}{4}$ and $x = \frac{50}{2} = 25$ inches.

Let $n = 16$; then $x^2 = \frac{50^2}{16}$ and $x = \frac{50}{4} = 12{\cdot}5$ inches.

A simple rule deduced from the above formulæ is as follows:—Divide 50 by the square root of the number of candles required, and the result is the distance in inches from the disc at which the mark must be made.

Thus, for 16 candles, $\sqrt{16} = 4$ and $\frac{50}{4} = 12{\cdot}5$.

The objections which have been raised against the Evans photometer are, on the whole, minor, in comparison to the advantages which its use secures; but it may be here stated that the main objections which have been brought forward are the shifting of the candles, and the inefficient ventilation of the instrument. The shifting of the candles, with this form of photometer, is unavoidable; but if care be taken not to make the movement too suddenly, there is little error to be apprehended in this respect. On the score of ventilation, however, there is great room for improvement, and there is no practical reason why increased air inlets should not be provided. It is a curious circumstance, that all those who are accustomed to use the Evans photometer have noticed a marked rise in the readings as an experiment proceeds. It is not improbable that the heating of the air, and its vitiation, arising from insufficient ventilation, are the main causes of this rise in the readings; and it is worthy of remark that, when the candles are burnt under ordinary conditions, as in the Bunsen or Letheby photometers, no such increase in the readings, as a rule, occurs.

(To be continued.)

* It seems somewhat doubtful who first suggested the use of reflecting mirrors in the Bunsen photometer; but it has been stated that they were originally proposed by a gentleman at the Woolwich Gas-Works. This much is certain, that the first introduction into practical use was due to Mr. F. W. Hartley, of Westminster, and that they were subsequently adopted by Dr. Letheby in the construction of his photometer.

BIRMINGHAM WATER-WORKS COMPANY.—The undertaking of this company having been transferred to the corporation, who, in accordance with the terms of the Birmingham Corporation Water Act, have discharged all the outstanding liabilities, a formal meeting of the old proprietors was held on Thursday last to receive the accounts of the liquidator, and to wind up the concern.

PROPOSED PURCHASE OF THE IPSWICH GAS-WORKS.—At the meeting of the Ipswich Town Council, on Wednesday last, the Paving and Lighting Committee presented the following report, which was accepted:—"Your committee have had under their consideration Mr. Stevenson's further report as to the proposed purchase of the Ipswich Gas-Works, and other information connected therewith, and have now to report that the directors of the Ipswich Gaslight Company have been informed by letter from the town-clerk that your committee were prepared to recommend the council to purchase all the real and personal estate of the company (except the reserve-fund of £1694 5s.), together with all the company's rights, powers, and privileges under their Acts, subject to the debts, contracts, and liabilities of the company, for perpetual annuities equal to £10 per cent. on the old shares of the company, and £7 10s. per cent. on the paid-up capital on June 30 last, on the new shares, or for annuities of like amount, to be redeemed by the corporation at the expiration of 20 years, at 20 years purchase. The annuities to be secured on the gas-works and borough-rate. The transfer to take place by Act of Parliament, to be obtained by the corporation and supported by the company. The directors of the gas company, in reply, stated that they were not prepared to recommend their shareholders to accept the terms proposed. Your committee are quite ready to show the council that the purchase of the gas-works upon the terms mentioned would be advantageous to the town, but as it is possible that the shareholders of the gas company may desire to confer with their directors on the matter, and further negotiations opened, it is considered desirable by your committee that the facts and figures upon which the proposal was based shall be withheld for the present."

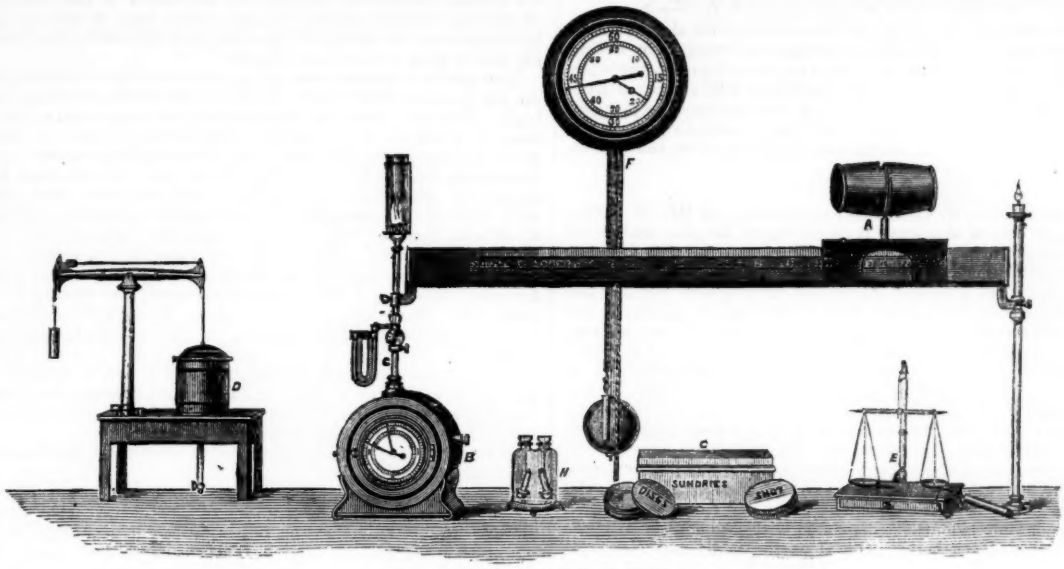

FIG. 1.—BUNSEN PHOTOMETER.

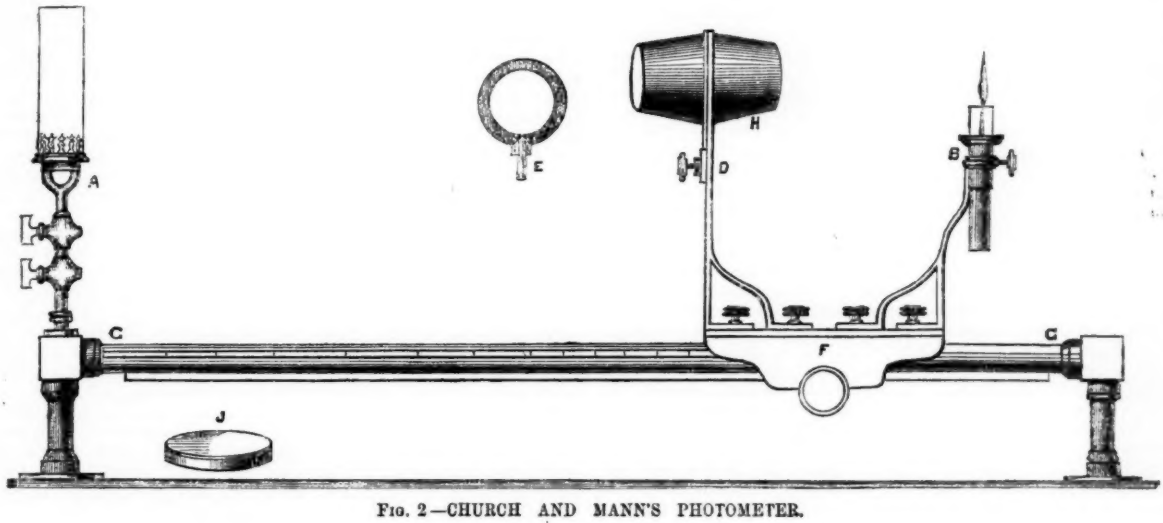

FIG. 2—CHURCH AND MANN'S PHOTOMETER.

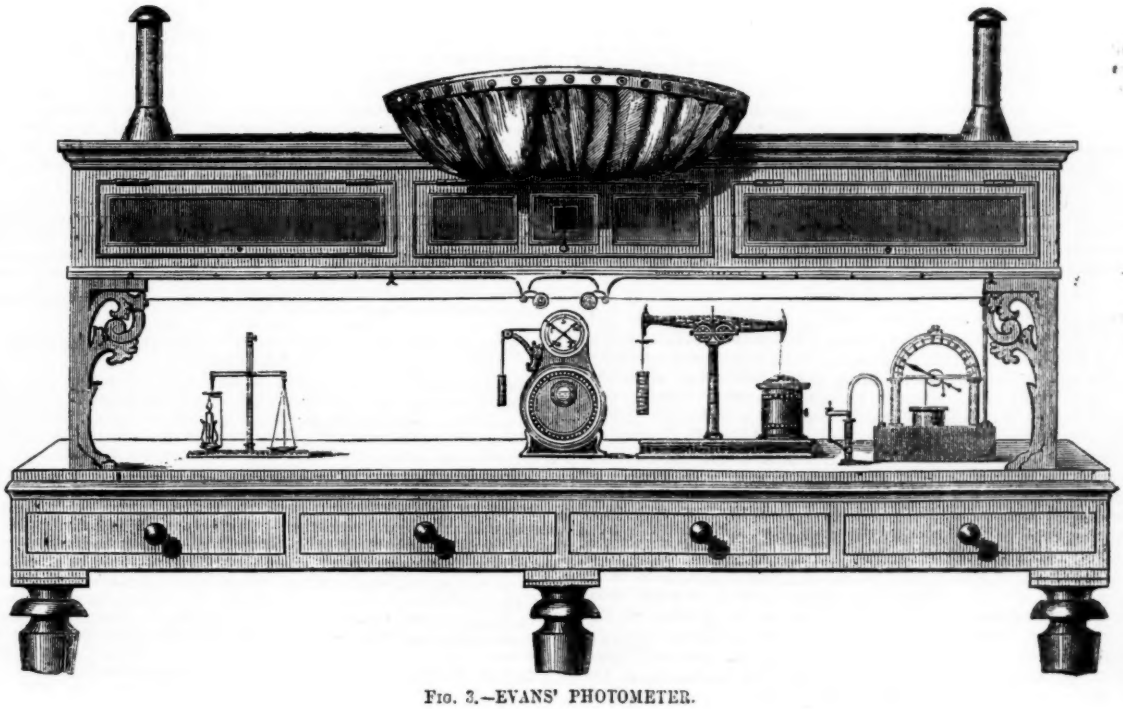

FIG. 3.—EVANS' PHOTOMETER.

MANCHESTER CORPORATION GAS-WORKS.

When we described, last week, the designs to which the premiums had been awarded, we intended to continue our remarks by taking the other designs in the order in which they were hung on the walls in the City Hall; but as some of the gentlemen who competed have kindly furnished us with full particulars of their schemes, we purpose, while not altogether losing sight of the above order, to give, in the first instance, those of which we have ample details from the authors themselves.

"*John Dalton.*"

This design by Mr. W. G. Coldwell, architect, and Mr. W. Mann, of London, is one of the least pretentious, as far the number of drawings is concerned. The report, which is very full and explicit, enters into the difficulty of arranging works of the magnitude required on a limited area, and states that "it has been felt that the works must not only be complete with every modern appliance, but also that, notwithstanding a large make is essential, the making power must not be extended at a sacrifice of efficiency and economy of production." The new works at Beckton have been followed in many respects, the different levels in the two works closely corresponding.

The cannel is brought to the houses at a high level in the trucks, direct from the colliery, the retorts are charged from stages, while the coke is removed at a low level under them. Four retort-houses, forming four separate sections, are arranged at right angles to the railway siding, but at such a distance from it that turn-tables, which involve considerable labour, are dispensed with, the additional space required by the curves being utilized as the additional stores for cannel required by the instructions. The saving in labour of curves over turn-tables is stated to be at least one penny per ton for every ton of coal carbonized, or upwards of £5 per day on the complete works when in full operation on the removal of cannel alone. The coke would be removed from the opposite end of the retort-houses on tramways, and by curves as before, and would be conveyed either to the canal wharf, or by a viaduct on an incline (as at Beckton) to the railway siding on the upper level. Each retort-house is 440 feet long, by 93 feet 6 inches in width, which includes a cannel store on each side under the rails, for carrying the trucks. There are shown in each retort-house 38 ovens with eight clay retorts 20 feet long. The make of each section has been taken at 3,040,000 cubic feet, or at 5000 feet per mouthpiece, if the retorts be charged four times in 24 hours, or at 3,750,000 feet if they be charged five times, giving totals of 12 and 15 million cubic feet in 24 hours. Horizontal condensers are proposed, placed between each pair of houses, 30 pipes to each section, 12 inches in diameter and 160 feet long, through which the gas would flow in three separate currents, regulated in a manner detailed; also water condensers in addition, 180 feet long, having six rows of 30-inch pipes to supplement the air condensers when the temperature requires it. One exhauster-house, to contain for the complete works five exhausters, is placed north of the retort-houses, and an arrangement of valves is proposed, so that any one of the five exhausters can be connected with any one of the four retort-houses. Three scrubbers are proposed to each section, 16 feet in diameter, 50 feet high, Mann and Walker's patent, which which has also been proposed to be used by many of the other competitors. The purifiers are in four sets of four each, 36 feet square, with Walker's centre-valves. Oxide only is proposed to be used for purification, the reason for which is discussed with special reference to the position held by the Corporation of Manchester as guardians of the public health as well as gas makers, and which we regret we cannot now give *in extenso*, as it takes up most fully the question of gas purification that has so long been agitated in the Metropolis. The purifiers are proposed to be carried on columns, the floor under being used for revivifying, and being supplemented by an area at the side. One meter-house is provided for four meters, each meter registering and checking the quantity of gas made in the particular house with which it is in connexion, and what we observed in this design only, there are check purifiers between the meter-house and the gasholders, one to be in use and the other in reserve. Six gasholders are proposed, three for two houses, each of 180 feet in diameter, with two lifts having a capacity of 2 million feet, giving a total capacity of 12 million feet.

Various details are given of a practical character, but we confine our observations to the general arrangements. The total cost of the whole is estimated at £540,000.

"*Comme il Faut.*"

This design is by Mr. John Somerville, of Dublin, and is also not so well illustrated as some of the others. Twice ten roofs of small span form two blocks of retort-houses, &c., which abut on the railway siding, the difference in the levels being taken advantage of to expedite the delivery of coals, as in most of the other designs, and facilities are given for loading coke by means of a moveable steam-crane on to the rails. One special point in this design is a complete arrangement of rails round the houses at a high level. The retort-houses comprise four sections. Each section contains five ranges of 15 double benches, having 30 furnaces. Each bench contains seven clay retorts, 21 inches by 16 inches, and 20 feet long, having 1050 mouthpieces, capable of carbonizing 525 tons of coal, and producing five million cubic feet of gas in 24 hours. A line of rails runs through each retort-house, as in the last-mentioned design, forming a working store of coals under, from which the stokers would take their supply. Further storeage is provided on the ground on the other side of the railway. Each range of retorts has its separate condenser outside the retort-house, into which the gas and liquor flows from the hydraulic main. By this form of condenser, as the author states, using his language, "the products from the retorts are allowed to flow together until all are cooled to the temperature of the atmosphere, giving the gas ample time to take up all the hydrocarbons it is capable of absorbing, and increasing the illuminating power from two to three candles."

The gas then passes from the condensers to the scrubbers, which are ten in number for each section, 15 feet in diameter and 30 feet high. It is then drawn by the exhausters and delivered to the purifiers, of which there are twelve to each section, 25 feet in diameter. These are in three sets of four each, controlled by a centre-valve for three to be always in use. "The three first to have lime, for the absorption, principally, of carbonic acid; the next three charged with oxide, for the absorption of sulphuretted hydrogen; and the last three with lime, to take up any remaining carbonic acid and bi-sulphide of carbon." This is the view stated by the author, but we question the correctness of his chemistry. Two meters are provided for each section, and three gasholders, capable of storing 5 million cubic feet. From each section a leading main delivers the gas into a rectangular main, 4 feet square, in the governor-house at the entrance.

The works are stated to be designed with a view to simplify every part of the apparatus, to admit of the greatest economy in labour and working expenses, and the manufacture of gas of good illuminating power with the lowest per centage of cannel.

The cost of one section is given at £189,000, or of the complete works at £737,000.

"*Crest of a Lion.*"

This design, by Mr. John Eunson, of Northampton, shows a large store for cannel adjoining the railway siding, and a supplementary one on the other side of the line. There is an efficient system of rails for supplying it in front of the retort-benches, and also for the exit of coke, which latter it is proposed to raise to the level of the rails by hydraulic lifts. The most striking feature of this design when completed would be one large retort-house, 170 feet long, as measured from the cannel store, and in thirteen divisions, three of which are proposed in the first section of the works, each having three ranges generally, with seventeen ovens and ten retorts to each oven. The total is given at 211 benches of ten. The width for the several benches is 56 feet, with a smaller span on each side of 10 feet for the trucks at the level of the rails and store for cannel under. The condensers are a series of flat upright pipes, with a surface of 2400 feet per million of cubic feet of maximum produce per day. Four tar and liquor wells are situated under the purifying-houses, and will each contain 600,000 gallons, equal to the make during 46 days. Three scrubbers are proposed for each section, 15 feet in diameter and 30 feet high.

Parallel with the retort-house, a range of buildings is proposed, in two divisions, each including the accessories belonging to a double section, or one-half of the whole. In the centre are placed two meter-houses, each having four meters, and then northward and southward there is, first, a purifying-house for one section, then boilers, exhauster, and pumps for two sections, followed by the purifying-house for the other section. The exhausters and purifiers are on the first floor level, with stores for oxide, &c., under. The purifiers for each are proposed to be ten in number, in two sets of four, and two separate boxes; both oxide and lime are to be used. Bridges are proposed for connecting the retort-house with the meter-house in the centre, and with the purifying-houses north and south of it. Six gasholders are proposed, 210 feet in diameter, to hold 2,400,000 cubic feet each, and three, 192 feet in diameter, to hold 1,965,000 feet each. The total cost is estimated at £633,375.

Correspondence.

BACK DIVIDENDS *VERSUS* RESERVE-FUND.

SIR,—Please allow me to supplement my communication, which appeared in your JOURNAL of Sept. 26th, by stating that I had not overlooked the 122nd section of the "Companies Clauses Act, 1845," giving the directors power to "set aside" such sum as they think proper for contingencies, or enlarging, repairing, or improving the works; but, in order to make this provision available, "the directors' must set aside any such amount *before* the meeting of shareholders at which the dividend may be declared. (See sec. 120 of the same Act.)

This provision, systematically carried out, would enable some companies to defer further application to Parliament for an almost indefinite period, but does not empower them to pay back dividends out of sums so set aside, unless such dividends can be classed as "contingencies;" nor does it touch my point in reference to the legalized payment of back dividends, and the authorized "reserved fund."

P. H. WILKINSON.

James Street, Harrogate, Sept. 27, 1876.

RECOVERY OF LIGHT OIL IN THE DISTILLATION OF SHALES.

SIR,—In your JOURNAL of Aug. 22nd you give a report of a paper read at the last meeting of the North British Association of Gas Managers, by Mr. Young (Clippens Oil-Works), "On the Utilization of the Gases resulting from the Destructive Distillation of Shale in the Manufacture of Paraffin Oil," in which Mr. Young describes, *as a novelty*, the use of intermediate paraffin oil for the "absorption and recovery of the very volatile hydrocarbons diffused through the waste shale gases."

It may interest some of your readers, and will increase Mr. Young's acquaintance with the operations of this company (some of which he refers to in his paper), to state that the absorption and recovery, by the agency of intermediate or heavy paraffin oil, of those volatile hydrocarbons referred to, which remain diffused through the waste gases from the shale, after these have been cooled to the temperature of the air, have been regularly carried on in this work, on a large scale, for the past *nine* years, and that the result has been a large production of such hydrocarbons.

JOHN CALDERWOOD.

Young's Paraffin Light and Mineral Oil Company, Limited, Addiewell Chemical Works, by West Calder, Sept. 29, 1876.

Parliamentary Intelligence.

HOUSE OF COMMONS COMMITTEE.

THURSDAY, MAY 11.

(*Before Mr.* ELLICE, *Chairman; Mr.* W. H. GLADSTONE, *the Marquis of* HAMILTON, *and Mr.* WROUGHTON.)

WAKEFIELD WATER BILL.

(*Continued from page* 453.)

Dr. *Charles Meymott Tidy*, examined by Mr. VENABLES.

I am a Master in Surgery of the University of Aberdeen, and a Bachelor of Medicine. I am a member of the Royal College of Surgeons, Lecturer on Chemistry, and Professor of Medical Jurisprudence and Public Health at the London Hospital. I was Medical Officer of Health and Public Analyst for Islington, and lately Deputy Medical Officer of Health and Public Analyst for the City of London. I have had a very large experience in all sanitary questions, including questions relating to water supply. As a lecturer on chemistry I have also studied it in that way. I have examined the Wath Main water several times since September, 1875. I reported one analysis which I made on the 7th of that month, another on the 5th of April, 1876, a third on water taken by myself on the 13th of April, and a fourth sample taken by Mr. Hawksley on the 15th of April. [The following table was handed in]

Analysis of Wath Water.

Constituents in 100,000 Parts.	Sample reported on Sept. 7, 1875.	Sample reported on April 5, 1876.	Sample taken by me, April 13, 1876.	Sample taken by Mr. Hawksley, April 15, 1876.
Actual and saline, NH_3	0·000	0·000	0·000	0·000
Ammonia from organic	0·0025	0·0015	0·002	0·003
Lime	3·92	5·76	6·07	6·37
Magnesia	3·74	3·35	3·96	3·58
Combined CO_2	9·145	9·865	8·76	9·09
Sulphuric anhydrides (SO_3)	4·375	4·590	4·69	4·40
Nitric acid (HNO_3)	None.	None.	None.	None.
Chlorine	7·160	8·998	4·52	4·13
Alkaline salts	4·043	3·550	7·02	4·40
Silica, alumina, and oxide of iron	0·715	0·721	0·86	0·71
Organic matter	0·071	0·015	0·003	0·009
Solid, by actual experiment	42·426	47·04	35·25	35·43
Carbonate of soda	9·885	6·56	5·041	5 33
Hardness before boiling	13·56	14·39	18·00	18·00
,, after boiling 15 minutes	2·27	1·71	5·42	3·40

The water analyzed by me on the 7th of September I found to contain no actual or saline ammonia—a very small quantity of ammonia from organic matter, so small as to be quite insignificant. I reported upon that water to the effect that it was an exceedingly good water, and recommended it for town supply, and I believe that was the first report given on that water. The water I analyzed on the 5th of April was practically the same as that taken on the 30th of March. It had changed a little, as I should expect it to have done. My analysis of water on the 13th of April was taken by myself from the top of one of the pumping-engines, which, in my judgment, was the proper place to take it from. The last sample was taken by Mr. Hawksley from the top of one of the engines, or from the top of both the engines, I may say, and they were mixed together. There are certain alterations I have noticed in the water. As a matter of fact, the amount of carbonate of soda since the first sample has very materially decreased. The chlorine also has much diminished.

Mr. VENABLES: Can you account for either of these changes? Are they what would be likely to occur, or is there anything special in them?

Witness: One knows, as a matter of fact, that water which is obtained from the carboniferous series of rocks in that region does vary considerably, and I know as a matter of fact that they have been boring deeper and deeper, which I think is quite sufficient to account for these changes in the analysis of the water, but I would say they are not of any practical moment. The chlorine is no doubt present as chloride of sodium. The chlorine and the carbonate of soda are perfectly harmless, even if they were in larger quantities. The presence of carbonate of soda prevents the furring of boilers, and I may say that when I was down at the collieries, one of the boilers, which had been at work for a week, was opened in my presence. It was perfectly clear; there was not the slightest sign of corrosion, and not the slightest sign of any precipitate whatever adhering to the sides of the iron. I myself took a stick and a brush and moved it about, and saw how perfectly clear it was from the very first. The late Dr. Letheby has over and over again said to me that he considered this a most excellent water for town supply. The hardness differs in various samples, but, after boiling, in every case it is small. For scouring and dyeing wool, the water, as a rule, being used in a boiling state, the greater part of the hardness would be got rid of, and it would really be a very soft water for the purpose. The permanent hardness of the present Wakefield water is 8°; it cannot be made softer. I have paid much attention to sanitary matters, and have had great practice in that way. Having considered this water, and compared it with others, I see nothing objectionable in it. There is nothing injurious in the quantity of magnesia it contains. During the last 10 or 11 years, I have made a large number of analyses of water, and in a great many instances have estimated the quantity of magnesia present. I could give a good many examples. For instance, at Leicester the amount of magnesian salts in 100,000 parts is 2·53 grains; at Worcester it is 5·34. The river Dearne—the Mexborough supply—contains 5·60 grains; and at Honiton, a very healthy town, the water contains 6·14 grains of magnesian salts. I could give a long list of waters which have a larger quantity of magnesia in them. If I were reporting upon them I should not say they were, therefore, necessarily objectionable. I have reported favourably of the waters I have mentioned.

Cross-examined by Mr. MICHAEL: The ordinary dose of magnesia for an adult to produce a slight purgative effect would be a drachm. In this water I found a trace of albumenoid ammonia. I am quite unable to say how organic impurity gets into water in deep wells. I have not investigated it; it is much more of a geological than a chemical question. Whenever water is injurious to health, the material which is capable of doing that injury can be detected by chemical means. In this water, when blasting operations had taken place underneath, in the mine, there was a slight smell of sulphurous acid, which seemed to be less after a little while. When I first went down, there had been no blasting operations, and then the water had no smell. I think the smell I experienced was due entirely to the blasting. I did not see anything like sulphur in the rock. I do not think it strange in this case that the water should have varied, as to the proportion of hardness, as one to three in eight days, because, as a matter of fact, I know that boring operations were going on, and that therefore there would be constant changes in the water. I suppose that, perhaps, water from other sources might find its way into this water. The quantity of carbonate of soda is very large; it is not usual to find so much.

Mr. MICHAEL: Is it a fact that water, which is called mineral water, and which is drunk for curative purposes, contains a very small quantity of these saline materials in proportion to the effect which it produces?

Witness: Yes, that is the case; but I do not know that I am a great believer in saline waters.

Mr. MICHAEL: But they do produce a great effect upon the constitution, do they not?

Witness: I should want a great deal more evidence than there is in proof of that.

Mr. MICHAEL: Do you dispute that the drinking of saline waters—*i.e.*, waters taken from springs containing these saline elements—exercises a great influence on the human constitution?

Witness: I am decidedly of opinion that a great deal of the curative action which takes place, as is supposed by the agency of these mineral waters, depends upon the careful dieting which goes on at the same time that the waters are drunk, and not upon the waters themselves.

Mr. MICHAEL: That may be so far as the curative effect is concerned; but is there not absolutely a physical effect produced by these waters?

Witness: As a matter of fact, I have worked out this subject a good deal, and I do not think there is much.

Re-examined by Mr. BALFOUR BROWNE: The early rising, regular hours, and other things that are compulsory at water-drinking establishments, have a great deal more to do with the recovery of health than the water that is drunk there. The carbonate of soda in this water is perfectly harmless, and is an advantage, so far as boilers are concerned. Carbonate of soda is used in the process of tea-making, to soften the water.

Mr. MICHAEL: I ought to have asked you one question—you hold the view that if sewage is admitted into water in the proportion of 1 to 25, and it runs for four miles in a river, it is entirely destroyed?

Witness: Oh dear, no. You will excuse me for saying there is no sewage in this water; but what I have stated is this, that if one part of sewage is mixed with 20 parts of water, and has a run of 20 miles, you cannot find a trace of that sewage at the end of its journey; and I believe, most strongly, that the water is perfectly harmless.

Mr. MICHAEL: That is to say, if a gallon of the sewage of London is mixed with 20 gallons of Thames water, and runs for 20 miles, nothing whatever is to be found of the original sewage?

Witness: No; it is perfectly harmless.

Mr. BALFOUR BROWNE: And you have come to that conclusion from a large number of experiments?

Witness: I may say that I was engaged in making experiments on the river Trent, and on various other rivers in England respecting the admixture of sewage, and the results of the flow of the river after certain distances. I made some hundreds of experiments on the subject, and I am certain that if a river has a good flow—a firm rapid flow—and one part of sewage is mixed with 20 parts of water, the whole of that sewage becomes oxydized at the end of the twentieth mile, and it is in a perfectly harmless condition.

Mr. BALFOUR BROWNE: If that were not the case, should we have such a thing as a pure river in the country?

Witness: The fact is, life would be unbearable if there were not some natural process by which sewage was destroyed. We could not drink one drop of the water of any river in England. Take another case, which I know very well—one part of sewage mixed with 200 of water, after a flow of 4½ miles, and there is not a trace of sewage to be found. I have made the experiment on sufficient quantities of sewage over various distances. But this question has nothing to do with the present inquiry, as there is no organic matter in this water, or the merest trace in the world—0·7.

The CHAIRMAN: I think we have the witness's opinion sufficiently on this water.

Witness: It is a most excellent water.

Dr. *G. H. Ogston*, examined by Mr. SALISBURY.

I am an analytical chemist practising in London. Mr. Way brought two samples of water to me, one said to have been taken from the Wath Main north shaft, and the other from the south shaft, on March 30, 1876. We made the analyses with each other, and our results are identical. I heard Professor Way's evidence, and I concur in what he said. I consider this water an exceptionally good water for common use, and for manufacturing and engineering purposes.

Cross-examined by Mr. MICHAEL: I can give no opinion as to the reason of the difference shown by the table as to the constituents of the water on the several dates. I can only surmise that it arose from the greater depth to which the borings had reached on the latter days. I have no experience as to the deposition of salt beds in sandstone above or below the coal measures. I know that, occasionally, there do occur depositions of salt of a very slight character, interfering with the quality of the water when it is obtained from the sandstone.

Re-examined by Mr. SALISBURY: That is in the red sandstone, and not, as as far as I am aware, in stone of this character.

Mr. *John Cooper*, inspector of nuisances at Barnsley, was then called to prove the collection of the water from the Wath Main colliery for the purpose of analysis, and Mr. *G. Townsend* spoke to the delivery of the samples at Mr. Poppleton's mills.

Mr. *Richard Poppleton*, examined by Mr. BALFOUR BROWNE.

I am a worsted and yarn manufacturer at Horbury, near Wakefield. At the request of the water-works company I received the water sealed up in barrels, as described by the two last witnesses. I was told that two lots of the water had come from the proposed new source of supply. I began to scour 600 lbs. of wool with the water, using 100 lbs. of mottled soap in three suds. I produce a sample of the wool as scoured. It is a satisfactory sample. It took 74 lbs. of soap to scour the wool, and 18½ inches of water. I received some water from the Field Head reservoir, and went through exactly the same process with it, and I produce a sample of the wool thus scoured. In my opinion, both samples are well scoured. I used 81 lbs. of soap, and 24 inches of water, to scour the wool with the Field Head water. This shows that there was a great saving in soap in using the Darfield water. I believe it would make a difference or gain of about £500 to some firms in Wakefield if that water was used. I afterwards made other experiments with both qualities of water, along with Mr. George Marriott, of Wakefield. It then took 26 lbs. of soap to scour 360 lbs. of wool with the Wath water, whilst the water at present supplied to Wakefield took 30 lbs., or 4 lbs. more, of soap. The wool and the soap used in all the experiments were the same. I therefore came to the conclusion that there would be a great saving by using the water proposed to be supplied to Wakefield. I have also submitted the water to a severe test for dyeing purposes, and I produce samples of scarlet, magenta, and violet worsted and yarn, dyed with both the Wakefield and the Wath water. There is very little difference in the samples, particularly with the magenta. If there is a superiority, I think the scarlet dyed with the Wath water is a better colour. The materials used in making both experiments were the same. The experiments were complete, and showed that the Wath water is very good for manufacturing and dyeing purposes, and very suitable for a town like Wakefield. I think a successful experiment and an exhaustive trial could not have been made with a less quantity of each water.

Cross-examined by Mr. MICHAEL: I am not in the slightest degree interested in the water company. With the first experiment a larger quantity of soap was used than we ordinarily employ—I should say 25 per cent. more. If I had altered my mode of manipulation I could have done with less; but in order to make the thing complete and satisfactory to my mind, I determined to

have two experiments, one conducted in one way and the other in another. In the latter I used as little soap as I possibly could.

The CHAIRMAN: He did one in the least, and the other in the most, economical manner.

Re-examined by Mr. SALISBURY: As the result of both experiments, I have arrived at the conclusion that the Wath water is better for scouring than the water I got from Field Head. It is cheaper as regards the consumption of soap, and equally satisfactory in the result.

MONDAY, MAY 15.

Dr. *Tidy* recalled, and further examined by Mr. BALFOUR BROWNE.

I made an analysis of the water from Mr. Widdop's well, at the steam saw mills at Wath, taken on the 1st, 3rd, and 7th of June, 1874. I have the analysis here. I can only say that it contained 0·002 of actual ammonia; 3·114 of nitrogen, as nitrates; about 477 feet deep—that was the label on the bottle. I cannot tell how many parts of magnesia I found in 70,000 grains of that water; but I can tell you that the hardness was 29 and 30 and 31 degrees, according to Clarke's scale, the imperial gallon. Of nitrate of magnesia there was 18·47 grains, in the second sample 18·78 grains, and in the third sample 21·18 grains; that is in the gallon, and not in the 100,000; and there were also 10·6 grains of common salt, varying up to 11 grains. That is hardness varying between 29 and 32, and a permanent hardness varying between 11 and 12½. I think these are the important facts.

The following table was handed in:—

Constituents per Imperial Gallon.	Mr. Hartley's Well at Cowick Brewery, Snaith, 25 feet deep. 1st of June, 1874.	Mr. Raper's Pump at Snaith. Well about 22 feet deep. 1st of June, 1874.	Mr. Widdop's Well at the Steam Saw-Mills, Snaith. Well about 477 feet deep. June 1, 1874.	June 3, 1874.	June 7, 1874.	Mrs. Eleanor Whitely, Little Heck. Well in the Yard. June 3, 1874.	June 6, 1874.	Brewery Well, West Cowick. — June 7, 1874.	Average of all.
	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.
Actual or saline ammonia	0·001	0·001	0·002	0·002	0·003	0·002	0·002	0·001	0·0 2
Ammonia from organic matter	0·005	0·005	0·006	0·006	0·006	0·006	0·108	0·005	0·006
Nitrogen as nitrates, &c.	0·375	3·525	3·114	3 165	3 570	2·580	2·395	1·065	2·449
Earthy carbonates	20·06	14·19	14·18	14·18	13·76	7·37	7·16	14·10	13·12
,, sulphates	11·51	23·06	21·21	21·73	22·89	19·17	18·82	19·17	19·70
Chloride of sodium	2·83	17·93	10·62	10·85	11·09	11·56	11·56	4·96	10·18
Nitrate of magnesia, &c.	2·22	20·91	18·47	18·78	21·18	15·31	15 40	6·32	14·82
Silica and oxide of iron	0·79	0·81	0·72	0·89	0·91	0·75	0·79	0·84	0·30
Organic matter	0·28	0·40	0·48	0·40	0·34	0·51	0·59	0·28	0·41
Total per gallon	37·69	77·30	65·68	66·83	70·17	54·67	54 25	45·67	59·63
Degree of hardness	26·4	32·6	29·4	30·1	31·2	16·5	16 0	24·8	25·9
,, ,, after boiling a quarter of an hour	11·6	12·8	11·0	11·2	12·0	10·0	10·2	9·1	11·0

Mr. *Poppleton*, who was examined at the previous sitting of the committee, now put in samples of wool dyed and scoured by the ordinary process. He said he did not use Calder water for dyeing purposes. It took more acid to dye with hard water than with soft, but he could not say what the proportions were.

In cross-examination by Mr. LITTLER, he said: We do not use Calder water in dyeing fancy colours. It is from well water on our own premises. The wool is washed with Calder water. The water has been analyzed by Dr. Tidy, and is as follows:—

"*Sample of Water brought to me by Mr. Poppleton on May* 15, 1876.

Tested for hardness—

Before boiling, on Clarke's scale	gallon	= 16·0°
After ,, ,,	,,	= 11·0°
In 100,000 parts—		
Before boiling	,,	= 22·8°
After ,,	,,	= 15·7°

C. HEYMOTT TIDY."

Mr. *G. Marriott*, examined by Mr. GRANVILLE SOMERSET.

I was formerly in the employ of Thomas Marriott and Sons, of Wakefield, worsted and yarn manufacturers. Their goods were particularly good in colour. They could not be surpassed by any firm in England or on the Continent. During the whole time that they were in business their water supply was from the Chald Beck and the Balne Beck. They used rain water when they could catch it on the premises. The water of Balne Beck and Chald Beck was hard. I attribute the excellence of their colours to the purity of the water. The Beck water was a little hard, and took a little more soap in the scouring process. I made experiments with Mr. Poppleton with the Wath water for the purpose of trying the difference of the two waters for scouring purposes, and to test it against the water now supplied to Wakefield—the Calder water. The results were that the Wath water took 26 lbs. of soap to scour a pack and a half of wool, and the Wakefield water took 30 lbs. to produce the same result. The experiments were conducted in exactly the same manner in every respect. I have seen the colours produced by Mr. Poppleton, but I did not experiment on them at all. The colours which Mr. Poppleton produced with the Wath water were very good. Scarlets, magentas, and violets are difficult colours to get. I should give the preference to the Wath water in its cleanliness, which is most particular for dyeing. The Wath water is decidedly better than the Wakefield water. The quantity of water used in the scouring test was about 400 gallons, both of the Wath and Wakefield waters. That is a proper quantity to use to scour that amount of wool. A less quantity, say 120 gallons, would be no test at all with the present class of machinery. Many dyers, I believe, get puzzled with waters which they are not accustomed to. They do not know how to manipulate them, and, therefore, they judge wrongly of the effect. I know the Leicester worsteds. Taking the same colours, bright-dyed colours and good whites, they are very good in Leicester. I do not know whether the water there is hard or soft.

Cross-examined by Mr. LITTLER: As a manufacturer of experience, purity being equal in both cases, I prefer soft water to hard for one purpose only, that is for scouring, not for dyeing. I do not think it is particular whether it is very hard or very soft for dyeing. I do not think it requires more aniline with hard water than with soft. I do not think it matters much for dyeing whether the water is hard or soft I am aware that, as a rule, manufacturers are not satisfied with the condition of the water which they get at present at Wakefield. The Wath water is better; it is much clearer. The Wath water is not much better for dyeing than the present water, but it is better for scouring. It may make a difference, as much as 25 per cent. of soap, between using a hard water and a soft one for scouring purposes. At present I believe, as far as they possibly can, the Wakefield manufacturers mix all the rain water with the water supply that they can get. They soften it as much as they can.

Re-examined by Mr. GRANVILLE SOMERSET: Two or three of the largest cloth manufacturers in the neighbourhood of Dewsbury have come to Wakefield.

Mr. *G. Clapham*, auctioneer, of Wakefield, handed in a table extracted from the report of the Rivers Pollution Commission, 1868, &c., showing a comparison of the manufactures at Wakefield, and of some few of the manufactures in the west of England, situate on the rivers Frome, Windrush, and Diss—the degrees of hardness of the water in parts per 100,000 and the degrees of hardness over the proposed Wakefield supply.

Mr. *A. H. Green*, examined by Mr. SALISBURY.

I was formerly a senior Fellow of Caius College, Cambridge, and am Professor of Geology in the Yorkshire College of Science at Leeds, and a lecturer on Geology at the Royal School of Military Engineering at Chatham. I am employed upon the geological survey of England and Wales. For the last eleven years I have been employed almost exclusively on the Yorkshire coalfield. A good deal of the survey in Yorkshire was done by my own hand, and the remainder was done by officers of the survey acting under my directions. I see the proposed district on the map where it is intended to put the pumping-station. I have reason to know that portion extremely well. I have walked over almost every field in that portion of the country.

Mr. SALISBURY: Now, will you describe in your own way how we propose to take water from that district?

Witness: I think the first point to call the attention of the committee to is the direction in which the strata dip. In a general sense, the beds in this country are dipping towards the north-east. [Witness described, by the aid of maps, the special features of the district, and continued:] From a very intimate knowledge of the ground, I have convinced myself that over the space I have been describing there is no fault of sufficient size to break the continuity of the rock, or to interfere with the free flow of the water. The superficial area of the rock from which the water can be obtained is not less than five square miles. I consider the proposed pumping-station admirably placed for getting water. There is convincing proof that there is a large quantity of water imprisoned in the sandstone rock, because all the collieries which have been sunk there yielded an enormous quantity of water. At the Wath Main Colliery 3 million gallons a day were pumped out, and before the tubbing was put up there was at least 3,500,000 gallons a day. Large quantities were also pumped out at the Ardsley Oaks, Darfield Main, Mitchell Main, Manvers Main, and other collieries. I think there is no danger of the supply of water ceasing, and I am not aware that any danger is to be apprehended from the coal workings going under the proposed well. On the whole, I think the promoters have selected a good spot for their water, and that they may reasonably calculate upon an abundant and continuous supply.

The cross-examination of witness was directed to the question of possible faults existing, which had not been proved, and was carried on with constant reference to maps as to the geology of the district.

In re-examination, witness said: The faults are most of them very small indeed. All of them, without exception, have a downthrow considerably less than the thickness of the rock, and, therefore, they cannot effectually sever the two portions of the rock; they cannot seriously interfere with the underground course of the water. This part of the country has been sufficiently tested already in the workings. I think when we see a section like that section underneath the map, the depth at which the coal has been actually proved at colliery after colliery, and also avail ourselves of the positions of the coal that have been proved at a considerable distance from the shafts, it shows conclusively that the district must be free from any fault of any considerable magnitude, any fault that would have a throw—anything greater than the thickness of the Oaks rock.

Professor *D. T. Ansted*, examined by Mr. GRANVILLE SOMERSET.

I am a Fellow of the Royal Society, and have for more than 30 years applied geology to practical inquiries, especially to water questions. I know something about the coal measures, and am well acquainted with all these measures and the overlying rocks therein. This district has been remarkably well proved so far as regards the main seam of coal, the upper seam of coal, that is the important seam—the Barnsley coal—particularly well proved. The red sandstone extends from Mitchell's Main to Swinton, a distance of area of about 3000 acres. It is a district that rises towards the south, the beds dipping towards the centre. The dip inclines so as to form a sort of basin of that part of the rock towards Darfield. The rock itself is not covered, except at intervals with a little shaly matter. In the valley where it comes down near Darly it is all covered for some little distance with alluvial material, partly perhaps clay, chiefly sandy and ordinary alluvium. It receives the waterfall of the district, and absorbs it, of course; and being an open rock, the water come into it very freely. I mean it is a rock fissured—cracked in various directions. I am quite satisfied, from my observations on matters of this kind, which have been very numerous, that the water which is obtained comes through fissures. A very large body of water is undoubtedly contained in the rock; but that water is not obtainable by exhaustive pumping, except very indirectly. I should think from three to four million gallons per day could be got from this rock. From the Oak sandstone that quantity is certainly obtained already, or has been proved in several places. A great thickness of very impermeable material occurs between the Oak sandstone and the Barnsley coal, which is the first coal that is considered important enough to be worked steadily. These bands of shale would certainly keep back the water. The collieries in the neighbourhood have been obliged to tub off the water in order to get down to the coal. In my opinion, the proposed pumping-station will be well suited for collecting the water in a convenient place in a basin from the rock. I have not the slightest doubt, if Parliament grants this bill, that the company will be able to supply a very large quantity of water from that station. There is no danger of coal water being pumped up into the sandstone water. I am of opinion that the bill proposed is a very good scheme for Wakefield.

Cross-examined by Mr. MICHAEL: I should call this rock as pure as any sandstone. It is as homogeneous in its texture as sandstones generally are. [Witness was questioned at great length, and explained, by the aid of maps and sections, the character of the various strata in the district.] The quantity of water is dependent upon the amount that falls in the 3000 acres, with a small addition from the country outside. I consider that the Wath Main sinking, or any other sinking, would pump a certain quantity of water from it; they would not exhaust it, because in all probability it is a very large basin; but whatever the basin is, it would be supplied by the rain from the outside, and though the quantity contained in it would be enormously large, still we should ultimately depend upon the drainage around it. I think that we could calculate upon a uniform supply of water of as pure a character as any such water is likely to be

pumped through strata of a similar character. I cannot explain to the committee why within a fortnight in the same stratification with the same bore to the same mine, the water differed in certain ingredients in the proportion of 100 to 400. I cannot give any account to the committee why the constitution should be entirely changed within a fortnight, in the very basin from which there is pumping.

Re-examined by Mr. GRANVILLE SOMERSET: I consider that there is scarcely any district that is more completely tested in that way than this is, except one that has been entirely worked out. The coal has been in full work for a long time with a great many moderate-sized collieries carrying their works out to meet; and taking it altogether, it is remarkably well proved—as well proved as you can expect a colliery district to be that has not been exhausted.

The CHAIRMAN: Do you think that the water found at the sinking at Wath Main is a fair test of the quality of water to be found at the proposed pumping-station?

Witness: I imagine so, because about the same quantity was found at Darfield Main and at Mitchell Main on the other side, both of them of the proposed pumping-station.

Mr. *E. Beecher*, mining engineer and manager of the Sandhill Colliery; Mr. *G. Shaw*, mining engineer and manager of the Wath Main Colliery; and Mr. *J. Beaumont*, mining engineer and colliery proprietor, described at length the character of the district, and the nature and extent of the mining operations and probabilities as to the abundance and continuity of the supply of water from the proposed source.

TUESDAY, MAY 16.

Mr. *J. Dyson*, engine-wright and pit-sinker at the Wath Main Colliery; Mr. *J. F. Thomson*, mining engineer of the Manvers Main Colliery; Mr. *R. Pease*, of Darfield Main Colliery; Mr. *B. Sellars*, mineral surveyor; and Mr. *J. Mitchell*, of the Mitchell Main Colliery, gave similar testimony to that furnished by the last witnesses on the previous day.

Mr. *T. W. Embleton*, examined by Mr. BALFOUR BROWNE.

I am a mining engineer, and president of the Midland Institute of Mining and Civil and Mechanical Engineers, and one of the examiners appointed by the Home Secretary for granting certificates under the Miners Act of 1872. I am well acquainted with the valley of the Dearne, and am managing engineer of the Thrybergh and Rawmarsh Colliery in that district. The whole of the valley is overlaid by a bed of sandstone rock, called the Oaks rock, which is a grey porous stone, lying at a depth of about 40 yards, and having a thickness of about 90 feet. It is a water-bearing rock, containing large quantities of water. The rock has to be passed through to reach the Barnsley coal below, and the quantity of water encountered has been most serious. At Darfield Main some years were spent in overcoming it; and more recently it has been met with in great abundance at Mitchell's Main, New Manvers, and Wath Main; and at the latter place the water is not yet overcome. All the experiences of the valley convince me that there is abundance of water in the rock, and quite sufficient for the wants of Wakefield for many years to come. I consider the site of the pumping-station well chosen, and that there is every probability of a similar quantity of water being met there to that which was met with at the present and in past sinkings, as it is more on the dip of the strata and nearer the great throw, which acts as a dam against the water passing to the north. Pits cannot be sunk in the neighbourhood through the Oaks rock without tubbing back the water. The area whence water will flow to the pumping-station is ten square miles. I apprehended no danger from the subsidence of strata under the rock by working the Barnsley coal. There must be a great sinking to fracture to pieces a rock 90 feet thick, and it must amount to fracturing to allow the water to escape. From my knowledge of the valley, I am of opinion that a permanent supply of water will be found there.

Mr. *Edward Filliter*, examined by Mr. GRANVILLE SOMERSET.

I am a civil engineer, and for the last 10 years have been the engineer of the Wakefield Water-Works. Mr. Hawksley is the consulting engineer. Amongst other works in which I have been engaged, I may mention the Leeds Water-Works, which are very large. I have also constructed several others in Yorkshire.

Mr. G. SOMERSET: Will you have the kindness to describe to the committee the scheme proposed by this bill, in an engineering point of view?

Witness: We propose to sink a shaft at the point marked on the map, "Proposed Darfield Pumping-Station." We propose to sink there, through what we believe to be a bed of shale and rock intermixed, down to the great thickness of rock called the Oaks rock. We propose to put pumping-engines there, and to lift the water along a line of pipes to the Houghton reservoir. That will be a covered service reservoir, designed to hold about three million gallons. The works at Darfield will be capable of pumping about that amount of water. From Houghton reservoir the water will run along a line of pipe to a service reservoir at Chevet. That reservoir will be about 303 feet, when full, about the level of the sea. From Chevet the water will run along a line of pipe northwards through Wakefield, but we propose to carry a main from the end of that up to the Field Head reservoir, and up a stand-pipe at Field Head, so as to enable us to supply St. John's district and a lunatic asylum, and one or two other customers who require a higher pressure with a 50-feet, or thereabouts, pressure more than they now have. The water will return to Wakefield in the lower part of the town from the Field Head reservoir. The reservoir to the south-east on the high ground at Swinton was designed for the purpose of supplying the districts of Wath, Mexborough, Swinton, and the neighbourhood. The whole length of our pipe is about 15 miles. The estimate for the whole of the works is, in round numbers, £152,000, which includes the cost of land and the usual 10 per cent. for contingencies. I am satisfied that that is sufficient. The quantity of water at present supplied to the town is about 1,100,000 gallons per day; we propose to put up works capable of pumping 3 million gallons, and to supply an increased district. When the works are completed, the quantity of water required for the district proposed to be supplied will be 2 million gallons per day; and I calculate on obtaining 3 million gallons from the pumping-station at Darfield. I have no doubt a great deal more will be got. I propose to have three engines that will raise 4,500,000 gallons per day, if they were all employed at one time. There is a complaint that a certain portion of Wakefield—St. John's district—is not properly supplied at present; that is in consequence of want of pressure at Field Head, and partly on account of the increased draught from the lower part of the town, which deprives the highest part of the town of the pressure it would otherwise receive. That is the best part of the town. By this scheme we shall be able to do what they think ought to be done to their district. I was at Wath Main on Sunday, the 5th of March, with Dr. Letheby and Mr. Sykes. Sunday is the best day for taking samples from colliery sinkings. I saw the samples taken by Dr. Letheby, and assisted to take them myself; and also for Dr. Frankland. Dr. Letheby expressed himself to me to the effect that he had seldom seen so beautiful and so clear a water. He said it had that delicate blue tint which is indicative of the finest quality of water; that it is similar to that which you see in some of the Swiss lakes. I was also at Wath Main with Mr. Hawksley, Professor Ansted, Mr. Beacher, and other gentlemen, on the 15th of April. The water looked excellent.

Cross-examined by Sir EDMUND BECKETT: The Wakefield Corporation were with us in the Langsett scheme of two years ago, and I think that is the only occasion upon which they were with us. That was a soft-water scheme. I do not call this a hard-water scheme in the sense in which those previous schemes alluded to were hard-water schemes. The only soft-water scheme we have been for was that of Langsett, and that was from two to three degrees of hardness. This is about ten or eleven degrees of hardness, and boils down to about two degrees. I represent it as boiling down to two. I put the initial hardness as ten here. I should like to call it a moderate hard-water scheme, with the peculiarity that the water boils down to two degrees of hardness. The water that Leeds used until a few years ago was from ten to twelve degrees. They went to the valley of Washburn for a different water. Dewsbury uses a soft water. Huddersfield has a soft water. There is not any town in this neighbourhood which occurs to me as having a water at even ten degrees at present. Barnsley has a soft water. Batley is going for a soft water scheme now. I call about five or six degrees of hardness as soft. The water of Bradford is soft. It is collected from the Wharfdale Hills. Ilkley is in this very district from which Bradford gets its supply. The tunnel which Bradford has driven approaches very closely to the limestone. I believe it is in it. Halifax is a soft water, and Sheffield is a soft water. From Hudson's Pit we are getting at present about half a million gallons per day. Our total supply is something like 1,200,000 gallons a day. The Calder water has about fourteen degrees of hardness.

Re-examined by Mr. G. SOMERSET: The Hudson's Pit well is really our own water. Its depth is 45 feet. I cannot tell, but it may possibly be water filtered through from the Calder. We cannot depend on it for a further supply than the quantity we have now. I had nothing to do with the negotiations with reference to the Holmfirth scheme.

(*To be continued.*)

Legal Intelligence.

HIGH COURT OF JUSTICE — CHANCERY DIVISION.

TUESDAY, SEPT. 26.

(*Before Baron* HUDDLESTON, *Vacation Judge.*)

UPWARD *v.* SAO PEDRO (BRAZIL) GAS COMPANY, LIMITED.

Mr. MILLER, Q.C., appeared for the plaintiff, and Mr. E. WARD for the company.

The defendant company were established in 1871, with a nominal capital of £110,000, in 22,000 shares of £5 each, for the purpose of making and selling gas, and establishing gas-works in certain maritime cities in the province of Sao Pedro, in the empire of Brazil; 20,626 shares had been issued, and £103,044 paid up thereon, and debentures had been issued on two several occasions to the total amount of £100,000. Mr. Upward, who was a share and debenture holder, and who had been engineer of the company, now moved for an interim order appointing a receiver, pending the hearing of the action, in which he claimed, together with other debenture holders, to be entitled to all the available assets of the company under the terms of the debentures. It was alleged in an affidavit, filed on behalf of the plaintiffs, that the only works the company had carried out were those arising under a concession, which had been purchased by the company, for supplying the town of Rio Grande Pelotas and one other town with gas; and that the mains and works of the company in those towns were their only assets, such assets being totally insufficient to meet the liabilities.

His LORDSHIP made an order in the terms of the notice of motion.

WESTMINSTER POLICE COURT.—FRIDAY, SEPT. 29.

(*Before Mr.* ARNOLD.)

CHARGE OF GAS STEALING.

Mr. *Luke Burnett*, of 41, Great Smith Street, Westminster, was charged with stealing about 400 cubic feet of gas, the property of The Gaslight and Coke Company.

Mr. ARNOLD said, from the information that had been filed, it would be a question whether the gas was consumed with a felonious intent. The company might recover the value of the gas in a civil proceeding. It was a very serious thing to charge a man with a felony, when the circumstances almost seemed to point to the fact that he had acted inadvertently, although foolishly.

Mr. HUMPHREYS, for the company, said other cases of the sort had occurred, and he would bring the evidence before his worship.

Mr. *Browning*, inspector for The Gaslight and Coke Company, said on the 19th inst. he saw the defendant at the offices of the company, and he entered into a contract. A meter was sent to his premises on the following day, and the prisoner promised to fix it himself, as he was a plumber. The shop was that of a corn chandler. On the 23rd witness went with another man to defendant's premises and saw the meter under the counter; it was not attached to anything. He found the company's service-pipe with a ¾-inch cock on it; the cap had been taken off, and a piece of pipe screwed on to the cock, the other end communicating with the defendant's own fittings. The whole was very insecure, being only fastened with white lead. Witness gave instructions to have the supply cut off. Witness afterwards saw the defendant, who said he was very sorry, but in consequence of other work he had not had time to fix the meter.

Mr. ARNOLD said he had expressed his opinion at first, that the proceeding seemed rather a harsh one, and now the prosecution had utterly failed. They had failed to prove any consumption of gas, having gone no further than proving that the pipe was fixed.

The summons was dismissed.

Miscellaneous News.

METROPOLIS WATER SUPPLY.

The following are the returns of the Society of Medical Officers of Health, on the composition and quality of the metropolitan waters in September, 1876:—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen. — As Nitrates &c.	Ammonia. — Saline.	Ammonia. — Organic.	Hardness (Clarke's Scale). — Before Boiling.	Hardness (Clarke's Scale). — After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	17·02	0·032	0·105	0·000	0·006	12·1	3·3
West Middlesex	17·50	0·032	0·096	0·002	0·006	12·7	2·6
Southwark and Vauxhall	18·30	0·046	0·098	0·000	0·006	13·2	3·0
Chelsea	18·00	0·035	0·090	0·001	0·007	12·7	3·3
Lambeth	17·12	0·042	0·105	0·000	0·008	12·7	2·4
Other Companies.							
Kent	27·35	0·003	0·390	0·000	0·000	19·4	6·0
New River	16·43	0·028	0·088	0·000	0·006	12·7	3·0
East London	16·22	0·028	0·093	0·000	0·005	11·6	2·4

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases but the following, when it was slightly turbid—namely, Grand Junction.

C. MEYMOTT TIDY, M.B.

EAST LONDON WATER-WORKS COMPANY.

The Report of the Directors to be presented to the Meeting of Shareholders on Thursday next is as follows:—

The accounts for the half year ending at Midsummer last, duly examined by the several auditors, are herewith submitted to the proprietors.

The revenue derived from water-rates stated therein amounts to £93,735 14s.; the amount for the corresponding half year of 1875 was £89,423 5s. 11d.

The expenditure from revenue, including the amount of £180 18s. 1d. charged in the dividend and interest account, is £37,668 14s.; in 1875 it was £35,824 18s. 6d.

The expenditure on capital account is £3169 8s. 6d., making the total amount £25,658 17s. 10d. beyond the capital received.

Progress is being made in carrying out the system of constant supply; the directors are satisfied that the introduction of this mode of supply will remove many of the evils resulting from the improper provision made by owners of property for the supply to their tenantry, and will eventually, by the exercise of careful supervision, reduce the amount of waste.

With the view of meeting the wants of the increasing district at Woodford, Buckhurst Hill, Chigwell, and the adjacent neighbourhood, requiring the supply delivered at a considerable elevation, a reservoir has been commenced on the company's land at Haggar Lane, Walthamstow, and a small engine will be erected there; these works may be estimated at £30,000.

Further capital to the amount of £80,000 will be required to replace the expenditure of £25,658 17s. 10d. referred to in the fourth paragraph, for the cost of the works now undertaken, and for the further extension of new mains and services.

The directors propose that this amount shall be raised by a further issue of debenture stock. The small amount required will not admit of a distribution amongst the proprietors, *pro ratâ*, but the terms of issue will be communicated to them by circular.

The works, machinery, and property of the company are all well maintained and in good order.

The water pumped during the half year amounted to 4,249,537,196 gallons, showing a small increase over the corresponding period of 1875.

The directors are happy to state that during the extreme drought since Midsummer, they have been enabled fully to maintain their supply, although the quantity of water pumped has greatly exceeded that in any previous season.

The directors recommend that a dividend at the rate of £3 per cent. for the half year on the ordinary stock, and of £2 5s. per cent. on the debenture stock, both clear of income-tax, be declared payable on the 10th of January next in the usual manner.

HARROW DISTRICT GAS COMPANY.

The Ordinary Half-Yearly Meeting of Shareholders, in this company, was held at the Guildhall Tavern, London, on Wednesday, the 27th ult.—James Glaisher, Esq., F.R.S., in the chair.

The Secretary (Mr. J. L. Chapman) read the notice convening the meeting, the seal of the company was affixed to the register, and the following report was presented:—

The directors are pleased to be able to report that the working and progress of the company still continue to be satisfactory.

The rental for the half year has increased by £170, or 7 per cent. on the corresponding period of last year; in the value of the residuals there is also an increase of £158.

The balance of profit and loss account shows a total of £975 1s. 2d. for disposal, out of which sum the directors recommend a dividend at the rate of 5½ per cent. per annum, which will leave £150 1s. 2d. to be carried forward to the next account.

Revenue Account, for the Half Year ended June 30, 1876.

Dr.				*Cr.*		
Manufacture of gas—				Sale of gas—		
Coals, including all expenses	£1,138	7	8	Lady-day quarter—		
Purifying materials, water, oil, &c.	33	16	6	Private rental—		
Salary of engineer	100	0	0	4,397,000 cubic feet at 6s.	£1,319	2	4
Wages	194	6	0	587,700 cubic feet at 6s. 3d.	183	13	3
Works, machines, and apparatus—maintenance of, repairs, and labour	124	10	6	Public rental and under contracts	129	6	6
Distribution of gas—				Midsummer quarter—			
Mains and service-pipes, repairs, maintenance, renewal, and labour	26	4	10	Private rental—			
Meters, renewing, repairing, and refixing	16	3	0	2,438,100 cubic feet at 6s.	731	8	9
Public lamps—				226,400 cubic feet at 6s. 3d.	70	14	9
Lighting	22	19	0	Public rental and under contracts	78	13	0
Rents, rates, and taxes—				Meter-rental, half year	67	13	9
Rents	16	14	2	Residual products—			
Rates and taxes	45	12	6	Coke, less labour and cartage	410	14	7
Management—				Tar	83	10	9
Directors and auditors allowances	110	10	0	Breeze	4	0	0
Salary of secretary	25	0	0				
Collector's commission	25	0	0				
Stationery and printing	15	11	9				
General establishment charges	70	8	10				
Sundries—							
Bad debts	12	18	4				
	£1,978	3	1				
Balance carried to profit and loss account	1,100	14	7				
	£3,078	17	8		£3,078	17	8

The Chairman, in moving the adoption of the report, said the directors had much pleasure in informing the shareholders that the condition and progress of the company were highly satisfactory; and the best proof of this was found in the second paragraph of their report, in which they stated that the rental for the past half year had exceeded by £170 the rental for the corresponding period of 1875. The rental for the half year ending June, 1873, was £1735. The rental for the last six months was £2512, so that in the past three years the half year's rental had grown no less than £777. Out of that £777, the sum of £170 was due to the last half year, and this indicated that the advance of the company's business had been constant and steady—an advance of the very best possible kind. The closing paragraph of the directors report spoke of a balance on the profit and loss account of £975, out of which the directors proposed to pay a dividend at the rate of 5½ per cent., carrying forward £150 to the next account. The net earnings of the half year were £1100. Three years ago, when he met the shareholders on a similar occasion to the present, the profit for the whole year preceding was only £1066. This surely indicated that the company were now in good working order, and carrying on their business in a satisfactory way. The second paragraph of the report also referred to the value of residuals. This was a point upon which he always fixed his eye. Sometimes the returns had not been as much as he could wish, and even now, good as they were in comparison, they were capable of improvement. The company had now a scrubber for the first time, and the use of this apparatus would convert their ammoniacal liquor into a saleable commodity, and make it a source of income they had not enjoyed before. Then with respect to coke. Two days previous to the meeting he was at the works, looking anxiously to see what had become of the stock of coke mentioned in the accounts. He was happy to state that it had so far been disposed of that there was hardly sufficient left to supply the present demand, and on inquiry he found that, although it had only been estimated at 10s. per chaldron, it had on the average yielded 13s. Coming now to the question of the rate of dividend which it was recommended should be declared, he might remark that the balance on profit and loss account would have enabled the directors to suggest the payment of 6 per cent.; but it was prudent that they should not do so, because the amount left in hand gave them a little working capital. They did not, therefore, recommend a higher rate of dividend than on the last occasion, and he believed the shareholders would approve the course they had adopted. At the same time, he reminded the meeting that the concern was now actually earning exactly the profit which was mentioned in the prospectus of the company at the first, and they had a fair probability of continuing steadily to progress as they had hitherto done—slowly, but surely, and, therefore, satisfactorily. The shareholders were aware that the company had, close to the Harrow Railway Station, a small gas-works. These works had always been a tenze to him. They tried to do without them; but it necessitated the weighting of the holders at the upper works so heavily as to create great liability to loss of gas through leakage. He was happy now to state that, acting on the good advice of the chairman of their Works Committee, Mr. Horsley, they had laid down a short mile of 6-inch pipe, which enabled them to supply the railway and the whole of the houses in the immediate neighbourhood from the principal works, and so do away with the duplicate station. The latter was always an inconvenience; the engineer could not be in two places at once, and the company never obtained a fair return of gas for the amount of coal used at the lower works. With the improvement now effected, and by the use of the scrubber, he thought the operations of the company would prove more successful than they had hitherto been. There was only one other point to refer to—a point not mentioned in the report, as usual—and that was the illuminating power of the gas supplied. On former occasions, the authorities of Harrow had two or three examinations made of the gas, and found it above the parliamentary standard. During the last six months, they had made no examinations; but he (the chairman) was in a position to state that during the whole period it had never been below the standard, and had generally exceeded it. Looking, therefore, at all the circumstances affecting the company and their prospects, he felt they had good reason to congratulate themselves, and he had much pleasure in moving the adoption of the report.

Mr. John Chapman (deputy-chairman) seconded the motion, and, in doing so, said he could endorse every word spoken by the chairman. He looked forward very sanguinely to the future of the company.

The motion was put and carried.

On the motion of the Chairman, seconded by Mr. Gray, the dividend recommended in the report was declared, and the chairman stated that the dividend warrants had been prepared, and would be handed to the shareholders at the close of the business.

Mr. Horsley and Mr. Baynes replied to several questions by a shareholder on one or two items in the accounts; after which

The Chairman moved a vote of thanks to the auditors, which was seconded by Mr. Chapman and carried.

Mr. Randall acknowledged the vote for himself and Mr. Fenton, and said that he believed, from the improved working of the company, and the more favourable circumstances of the present time, a balance-sheet even better than the present would be laid before the shareholders after Christmas next.

The Chairman, in moving a vote of thanks to the resident engineer and secretary, expressed himself as entirely satisfied with the manner in which the important duties devolving on Mr. J. L. Chapman were performed, and assured the shareholders that he well deserved their confidence.

Mr. Baynes seconded the motion, and said he could bear personal testimony to the very hard work done by Mr. J. L. Chapman, who had devoted himself with great energy to the business of the company, and had shown an amount of administrative capacity beyond what had been expected from him.

Mr. Randall supported the motion, which was put and carried.

A vote of thanks was given to the chairman and directors, and Mr. Glaisher having acknowledged the same for himself and colleagues, the proceedings closed.

WIGAN CORPORATION GAS DEPARTMENT.

Balance-Sheet from July 1, 1875, to June 30, 1876.

Revenue Account.

Dr.				*Cr.*			
Discounts account	£3,246	18	1½	Sale of fittings account	£135	7	8
Stokers and purifiers account	2,640	12	6	Rent of meter account	935	5	2
Visiting meters account	193	1	11½	Gas-rental account	25,190	4	1½
Clerks & collectors account	375	5	0	Tar and ammoniacal liquor account	3,089	0	9
Managing clerk's account	140	0	0	Sale of coke	2,389	7	9½
Auditor's fee (two years)	50	0	0				
Manager's account	230	0	0				
Gas consumed on premises	200	0	0				
Stationery, advertising, &c. account	119	5	8				
Repairs to works account	1,990	10	3				
Ditto to mains	379	17	3½				
Ditto to meters	215	6	1½				
Horse-keep account	59	14	4				
Coal and cannel account	12,949	14	4				
Purifying material account	104	1	3				
Rents, rates, and taxes account	903	4	4				
Balance, being profit	7,941	14	4				
	£31,739	5	6		£31,739	5	6

Profit and Loss Account.

Balance from last year (Being loss at that date, as shown in last balance-sheet.)	£3,961	3	9½	Balance of profit from trade account	£7,941	14	4
Interest on debentures	5,858	6	7	Balance carried down	2,189	2	9½
Bank interest and commission	311	6	9				
	£10,130	17	1½		£10,130	17	1½
Balance brought down	£2,189	2	9½				

Capital Account.

Purchase-money	£130,228	2	6	Works and plant	£134,774	19	2½
Extra outlay	2,863	6	10	Fittings on hand	459	8	4
Depositors account	261	10	0	Gas on hand	91	13	4
Amount owing treasurer	19,793	9	6	Coal and cannel on hand	2,448	18	11
Sundry creditors, including interest on debentures unpaid	6,914	6	7½	Coke on hand	91	13	8
				Tar on hand	489	7	6
				New meters	1 388	0	5
				New main-pipes	8,092	1	0
				Sundry debtors	10,035	7	1
				Cash on hand	0	3	2½
				Balance from profit and loss account — thus, amount shown as loss, July 1, 1875 £3,961 3 9½			
				Less profit, June 30, 1876 1,772 1 0			
					2,189	2	9½
	£160,060	15	5½		£160,060	15	5½

Metropolitan Board of Works.—At the meeting of the board on Friday last, it was stated that a letter had been received from the Board of Trade, in reference to the auction clauses inserted at the instance of this board in the bill of the Chartered Gas Company of last session, approving of the course taken by this board, and expressing an opinion that there is every reason to believe that the unqualified effect of the auction clauses (whatever the statutory dividend) will, taken in connexion with the sliding scale, be to promote economy and prevent the raising of unnecessary capital. The letter was referred to the Works Committee, with instructions to report to the board.

ROCKHAMPTON (QUEENSLAND) GAS AND COKE COMPANY.

The Seventh Half-Yearly Meeting of Shareholders was held at the Council Chambers, Rockhampton, on Thursday, June 23—H. JONES, Esq., in the chair.

The CHAIRMAN, in opening the business of the meeting, expressed the satisfaction he felt at being present on the first occasion at which profits were to be declared. He trusted that the future would show increased success, and a larger dividend. They had met with many difficulties which had now, he believed, been overcome, and if the shareholders would only use more gas they might look confidently forward to better returns.

The SECRETARY (Mr. H. Mills) then read the following report of the directors for the half year ending the 31st of May :—

The balance-sheet issued this half year shows a credit of £952 15s. 7d., being the total profits since the formation of the company. Out of this the directors propose a dividend for the past year at the rate of 10 per cent. per annum, which on 1894 shares amounts to £473 10s., leaving £479 5s. 7d. as a reserve-fund.

Your directors congratulate the shareholders on this increase of success, and believe that the progress of the company will continue to be satisfactory.

Very few of the preference shares remain on hand, and are in good demand.

The question of extensions is now engaging the attention of the board, and such as promise profitable returns will be gradually undertaken.

You are now called upon to elect two directors in the room of Messrs. J. Ferguson and A. Bell, who retire by rotation, but are eligible for re-election, and have given the requisite notice of candidature; Mr. W. P. Walker is also a candidate. Two auditors have to be appointed for the ensuing year.

The report of the engineer (Mr. W. Smith), appended to the report of the directors, was as follows :—

The wall of the gasholder-tank, which was found to be under the extreme high flood mark, has been raised so as to render it safe for the future. The station-meter has been fixed, and found to work in a satisfactory manner. I have found it most useful, not only in showing the daily amount of gas produced, but in checking the month's consumption, as shown by the consumers meters, the difference being the gas unaccounted for through leakage, condensation, and other causes. This item, I am glad to report, is a low one—about 7¼ per cent.—and will bear a favourable comparison with other gas companies.

There have been 184 tons of coal carbonized, and 1,575,310 cubic feet of gas sold, of a quality equal to 15 sperm candles. A considerable increase has taken place in the quantity of gas made per ton of coal carbonized, and also in the amount of gas sold, over the previous half year. The sales of coke and tar are satisfactory.

Liabilities and Assets.

Dr.						*Cr.*			
A. J. S. Bank				£807	16	6	Fixed investment—			
Original capital, 2000 shares at £5		£19,000	0	0			Land, buildings, machinery, meters, mains, &c.	£11,546	3	0
Preference capital, 1000 shares at £5		5,000	0	0			Floating investment—			
		£15,000	0	0			Coals, coke, and tar	369	0	9
Less due from original shareholdrs. £125 19 5							Sundry debtors	429	0	9
175 pref. shrs. unsold	875	0	0				Cash in hand, May 31	3	17	0
Balances on pref. shares not called up	2916	5	3							
106 forfeited shares	495	5	11							
		4,412	10	7						
				10,587	9	5				
Profit and loss				952	15	7				
				£12,348	1	6		£12,348	1	6

Profit and Loss.

Manufacture, distribution of gas, and management	£788	8	7	Balance brought forward, Nov. 30	£417	18	0
Interest account	104	4	10	Sales of gas, coke, and tar	1,404	5	6
Profit, November	417	18	0	Scrip and transfers	1	13	0
Profit this half year	534	17	7	Rent of dwelling-house	21	12	6
	£1,845	9	0		£1,845	9	0

The CHAIRMAN having moved the adoption of the report and accounts,

A discussion arose upon the proposal of the directors to retain so large a portion of the profits in hand as a reserve.

The CHAIRMAN explained that the desire of the directors was to provide for extensions yet contemplated, and because of the balance still due to the bank. He agreed in part with the shareholders who thought the whole of the profits to date should be paid as a dividend to the original shareholders, but on considering the subject, they had found, in declaring a dividend, the preferential shareholders would have come in on equal terms with the rest, and rather than do this they had thought it best to increase the reserve-fund. Although, when the preferential shares had been sold, they were stated to receive only 9 per cent., they had found, on inquiring from their solicitor, that they were entitled to 10 per cent. in the present dividend, the same as the rest, the only difference being that the preferential shares would receive the 10 per cent. for what money they had paid, and for a shorter time.

Mr. PATTISON thought the explanation given left the difficulty as before. The original shareholders would get their share of the £400 odd reserved, much better now than at a future time. After some further conversation had taken place, he moved as an amendment, that the report be amended by substituting "20 per cent." instead of "10 per cent." as the rate of dividend to be declared.

The amendment was carried by an overwhelming majority, and the report, as amended, was unanimously agreed to.

The retiring directors were re-elected, and Mr. Walker was elected a director in the place of Mr. Ferguson, who had resigned. The auditors also were re-elected.

Mr. W. PATTISON suggested the advisability of reducing the price of gas by another 2s. 6d. per 1000 feet, and said he thought that large consumers should have more consideration still. It was found that the large hotels were very expensive in this item, £16 per month being now the expense, when £5 had been the former monthly expenditure. He thought large consumers, such as newspaper establishments and public-houses, should have this consideration.

Mr. W. P. WALKER spoke in favour of the same, and suggested that 5 per cent. discount additional be allowed to large consumers.

The CHAIRMAN stated that the matter was already under the consideration of the directors, who, he thought, were quite prepared to make the concession.

Votes of thanks to the chairman and to the directors for the successful conduct of the business of the company were then adopted, and the proceedings closed.

DRAINAGE OF KINGSTON.—PROCEEDINGS AGAINST THE CORPORATION.—At the County Bench, Kingston, on Thursday last, an application was made on behalf of the Thames Conservators for a summons against the Mayor, Aldermen, and Burgesses of the Corporation of Kingston, acting as the Urban Sanitary Authority, for having neglected within the statutory period stated in the notice to prevent their sewage from flowing into the Thames. The period for which penalties would be asked for extended to 2000 days, and the amount recoverable was £50 per day. The applicant (from Messrs. Freer, solicitors to the Conservators) said that the question was a most serious one, and the amount claimed in penalties would come to a very large sum (£100,000). The summons was granted, returnable in a fortnight. It is understood that this week a similar application will be made against the Surbiton Improvement Commissioners.

HUDDERSFIELD CORPORATION GAS SUPPLY.

A Special Meeting of the Huddersfield Town Council was held on Wednesday, the 20th of September—the MAYOR (Mr. J. F. Brigg) in the chair.

The TOWN-CLERK read the minutes of the Gas Committee, from which it appeared that at their meeting, on the 12th of September they resolved—"That the price of gas be reduced from 3s. 9d. to 3s. 4d. per 1000 cubic feet, and that such reduction commence from the 1st of July last."

Alderman HIRST said he intended asking the chairman of the Gas Committee, if he had been present, a question relating to the proposal to reduce the price of gas; but as he was not, perhaps some other member of the committee would be able to answer the question. He saw that the committee proposed to reduce it 5d. per 1000 cubic feet, and it seemed to him to be too great a reduction. He should like to know upon what basis the reduction was fixed. In Manchester, where they had made a profit during the past year of £103,000 upon their gas, they proposed to reduce the price from 3s. 6d. to 3s. 4d.—2d. per 1000 cubic feet; and, in Huddersfield, with a profit of £5000, they were going to reduce the price by 5d., and it seemed to him that was a very great reduction indeed in comparison with the small amount of profit made.

Mr. EASTWOOD said he thought it would have been better if the price could be reduced to 3s., as he did not think the large gas consumers should help to pay the rates of those who did not use very much gas. That might be a question with some of them, but it did not seem just to him. He was a large ratepayer, and he only wanted what was right, but he considered that 3s. per 1000 cubic feet would pay.

Mr. HOPKINSON said when the matter was before the committee it was only decided by a majority of one vote that it should be 3s. 4d. against 3s. 3d.

Alderman SYKES moved an amendment that the price be reduced to 3s. 3d., and he said that when this question was before the council six months ago, he stated that he was amazed, and very much surprised to hear the remarks made on that occasion. The price of coal in 1873 was 25s. 5½d. for cannel, and 17s. 9d. for black coal; in 1874 it was 24s. 4½d. for cannel, and 11s. 10d. for black coal; in 1875 it was 18s. 8$\frac{5}{6}$d. for cannel, and 10s. 8½d. for black coal; and for 1876 it was 17s. 7¾d. for cannel, and 9s. 9$\frac{7}{10}$d. for black coal, delivered at the works. In 1874 the charge for gas was 4s. per 1000 cubic feet, and until recently they had been charging 3s. 9d. On the former occasion Alderman Mellor said it would be imagined from the argument made use of that the Gas Committee were intent on making a large profit on the sale of gas, and having made the profit they meant to stick to it. He thought it was pretty well known that whatever profit was made by the sale of gas must necessarily be transferred to the borough fund, and therefore it would really be stuck to. The committee had a profit of £2900. They had made that profit in half a year, and the reason why the gas was not lowered on the last occasion was, he apprehended, owing to the fact that they had made a calculation of 1d. for the twelve months instead of ½d. for the half year, seeing they were dealing with half-yearly profits. With regard to their present position in this matter, he should leave out all reference to what other towns were doing, because that was no guide whatever to them; they had the matter entirely in their own hands, and they could calculate, now that they had their contracts in, exactly at what price they could afford to make gas. Alderman Mellor, on the former occasion, remarked that it was proposed that there should be 3d. taken off the price for the half year, representing, as calculated, £3000; but they ought to have represented it at £1500, for it was only for half a year. There had been a profit this half year of £2500, and during the current year something like £5208 3s. 8d., and this profit had been already passed to the borough fund. They provided for the sinking-fund £1900 last year, and £950 this half-year; and the depreciation-fund was £842—and after making those provisions, they still had the profit he had named. He asked was it right, and was it ever intended, that the gas-works were to make a large profit, as was stated in the case of Manchester, and that the gas consumers should pay a larger price for their gas in order to relieve the rates of the borough? He apprehended not. What were the facts in regard to that? Take one instance—take George Crosland and Sons, at Crosland Moor, who made their own gas; they did not buy gas from the corporation, and yet they had been relieved of the rates of the town to the tune of 5d. in the pound during the past year, made out of the gas consumers of the borough of Huddersfield. Was that right? Then there was Richard Armitage, who resided out of the town and consumed no gas in the borough. Mr. Armitage was rated at £745, and he was relieved in the same way; and there were other people who took room and power and did not pay rates. It might be said that the rates were compounded for in the rental. But that was not quite the question. There were gentlemen who consumed large quantities of gas, and he asked was it right that they should be charged an extra price for their gas in order that a profit might be made to go in the reduction of the landlords rates? He would say not. Now, what was the position of things with regard to this half year? They had consumed 12,500 tons of coal and cannel; and they took 3d. per 1000 cubic feet off the gas last half year, and notwithstanding that they had made a profit of £2500. The difference in the price of coal this year was £625, and that would bring the total to £3125—that was upon the consumption of gas for the past half year; and, as they had heard in the minutes, they were making many new connexions, and therefore they might fairly consider that the consumption of gas would be much greater, and thus they ought to make better profits than in the past. The history of the gas consumption year by year showed that it had continually increased, and he thought the increase this year would be very much greater than it had been in former years. They had therefore a surplus of £3125 to deal with. Now, 1d. per 1000 cubic feet represented £1000 for the year, or £500 for half a year, and how did they deal with that? It was proposed to reduce the price from 3s. 9d. to 3s. 4d., which was 5d. per 1000 cubic feet, or 2½d. for the half year. They had £3125 total profit, and if they reduced the price 6d., that would be £3000 net, leaving a balance of £125 profit upon a calculation of the past half year's consumption; and they all knew that they had recently bought coal which went into the year's consumption, and the coal that had been used during the past half year was not yet finished. As that coal got finished they would improve their position, so he thought they had a right to expect that the profits, if the gas were reduced in price to 3s. 3d., would still be £500 for the half year. Hence he again asked, was it right to charge more for the gas than what was fairly remunerative to the town for the risk that the town had to run with regard to any accident that might occur? He thought they ought to take an early opportunity of insuring the gas-works—it could be done for a guinea per cent., so he was told—and if that was done they would be freed from the risk to which they were now subject. If they reduced the price to 3s. 3d., upon the face of it there was a profit of £125 for the half year; and as the coal they had lately bought was of a better class, he had no doubt that they would have a material increase in the amount of profit. He proposed the amendment, utterly regardless of what other towns had done; they in Huddersfield were giving a better illuminating power, and they intended to give it. He based his calculation on the figures supplied him, and he defied any gentleman to confute those figures.

Alderman HIRST seconded the amendment. There was a surplus of £2500, and if they took off 5d. they took away the profit; then there was a reduction in the price of coal per ton, which was 1s. 1d. per ton, and that would make £1100—bringing it to the same figures as Mr. Sykes had calculated. He contended that if 3s. 4d. were adopted, it would give a profit of from £1200 to £1500 for the next half year, and he considered it was too much to expect the large consumers to pay a higher price for their gas on purpose to relieve the rates. With regard to Mr. Armitage, he believed that, technically speaking, he

might perhaps burn two lights—one in the engine-room and another in the fireplace—but that was not the question. They were taking a larger basis. He took a mill free from rates, and he paid £120, or a little more, per year for gas, and the other man perhaps paid 2d., and he held that that was not dealing fairly by him. He recollected that when they were discussing this question, before the gas-works were bought, he went in for buying them, and his friend, Mr. Aston, went in against it, and said he was afraid if the gas-works were purchased it would end in what was now attempted to be done—namely, selling dear gas to relieve the rates of the borough. He (Alderman Hirst) stated that he thought the large consumers of gas would be able to take care of themselves; but it appeared to be hardly the case, for he never saw a more determined attempt than there was being made in the council to keep the gas at a high price, on purpose to bring down the rates of the town. He thought it was wrong to do so, and that they ought not to make a profit of £1000 or £1500 a year out of the gas-works.

Mr. J. A. HOPKINSON said he was placed in exactly the same position as Mr. Armitage; he received a large amount for room and power, but paid very little for gas; and looking at it in a fair spirit, as between man and man, he considered he should be doing wrong if he did not support the amendment. He did not see how Alderman Hirst could say that the profits went to relieve the rates of the borough; they might go to relieve the ratepayers. The smaller ratepayers were not concerned in it particularly, and the amount to be raised for borough purposes would remain exactly the same; and while, if they were to put the price at a high figure, it would relieve him in one sense, yet it would be doing wrong to others. Therefore it was that he took the stand he did, and as long as he was there to help to carry out municipal measures, he should act fairly to each and every ratepayer.

Mr. MARRIOTT thought it very surprising that, taking into consideration the illuminating power of the gas supplied, the Huddersfield Corporation should be asked to supply cheaper than any other town in the West Riding. The illuminating power of the Huddersfield gas was 20 candles, and they were asked to reduce the price to 3s. 4d., which was equal to 2d. a candle nearly. In Sheffield the price was 3s., and the illuminating power 15 candles, which was equal to 2½d. a candle; Leeds 3s. 4d., and 17½ candles; Bradford 3s. 4d., and 18½ candles; Halifax 3s. 6d., and 11 candles; and Dewsbury 4s. 6d., and 16 candles. The gas year always ended with June, and if they took from July, 1875 to June, 1876, the profits amounted to £5200. One penny per 1000 feet was about £1000, and, consequently, if they had reduced the gas on July 1, 1875, to 3s. 7d. per 1000 feet, there would have been no profit to the borough fund, or, in other words, the gas cost them last year 3s. 7d. per 1000. It seemed to him that there was one error arising from the way in which Alderman Sykes had put the matter. In the first half of last year the cost of gas was 4s. per 1000 feet, and they made nearly £3000, and after reducing it 3d. in the second half, they were now asked to reduce the price of gas by 5d., though the gas cost them last year 3s. 7d., and they only made a profit of £5200. The contracts had been made for coal for this year. Last year the quantity of coal consumed was 14,844 tons of cannel, and 9805 tons of black coal, and the price was £19,904. The cost that year for cannel was £14,049; and for black coal, £5853. This year the total cost was £18,037, which showed a saving of £1867. What else was there cheaper? Labour, rent, salaries would be dearer, and the only thing that would be cheaper was coal; and there was a probability that coke—which at present was 10s. per ton—would be cheaper, and thus that would go against them. All that they had to meet the reduction was £2000 They surely did not want to sell gas at a less price than they made it. Gas-making was a trading concern; they were there as a substitute for a trade concern—they had made a profit, and they had a perfect right to make a profit, and the benefit of it ought to go to the consumers. There was another item which went in favour of a reduction, which Alderman Sykes had omitted, and that was that by the Act of Parliament passed this year, which altered the way in which they should pay their redemption money, the money to be paid only amounted to £800, whereas last year it amounted to £3600, and that would be £3000, or £2800, to be added to the saving in coal. The total profit this year over the cost of gas last year was £4667, and they could lower it to that amount if they sold gas without profit—so that would be exactly the sum Mr. Sykes asked for. He repeated that the borough had a perfect right to have the profit, and the benefit of the reduction that had come from the Act of Parliament and from the reduction in coal. They must bear in mind that the price of coal was now at the bottom, and no one could say that it would be lower than it was at present; indeed, there was a probability that if there was the slightest improvement in the iron trade the price of coal would increase immediately. When they had nearly £200,000 invested in the gas-works, he thought they ought to have a profit of from £3000 to £4000. He saw that at Nottingham, where the price was a little larger than at Huddersfield, they were making gas as cheaply as possible, and they had just handed over a balance of £8000 to the borough fund, which they considered was a very moderate thing for a corporation to do with works of that magnitude. He thought they ought to have the gas in Huddersfield at a settled price of 3s. 6d., and if they fixed it at that for this half year, they could, if they saw fit, reduce it the next half; but he certainly should not advise its being lowered now. He was sorry that they were putting this question entirely between two or three individuals whose names had been mentioned, and he should ask why should they legislate simply for them? These persons were not equal in proportion to the thousands of ratepayers, and he would rather legislate for the great masses of the ratepayers in giving relief to the borough fund than lower the price of gas for the benefit of a very small number of renters of room and power.

Mr. GLENDINNING thought the council ought not to draw the line too finely, because if any event should arise during the year, and they should make a loss, the loss would have to be recouped by the ratepayers in proportion to the rates, and not by the large consumers of gas. In the district he represented some parts could not get gas at all, and they would have to pay towards the loss, and he objected to this very fine calculation in the interests of those people who were large consumers of gas. Take the water-works question—the small consumers there had to pay for the large ones; but they ought to have a little bit of equity in the thing. The water-rates of the small consumers were increased mainly for the benefit of the large consumers. In order to provide a large storeage of water for this district—for the development of the manufactures of the district—a large and unnecessary sum, with regard to domestic consumption, had been expended upon the water-works, for which the small consumers had to pay, and a very much less expenditure would have done to provide for the domestic consumption. That expense had been incurrred to provide for what they now spoke of as the large consumers, and he would only say that if the large consumer of gas got an advantage out of the gas, it was not fair to put down the price of the gas to such bare calculation of profit as not to allow of contingencies, and that there might be a possibility of what he might call outsiders having to pay for things which were now supplied to those within the inside. He would put it another way. The insiders were the main benefiters by the gas—they were the main consumers; the relief of the borough rate was carried over the whole of the borough, and what they in the outside got as a relief of their rate—inasmuch as they had to take the risks, and they did not get the advantages—was such that they had a reasonable right to say, with such a large outlay, expenditure, and risk, that they ought to have some fair chance of having a profit in relief of their rates. To a man in a cottage rated at £4, £5, or £6, the relief would be 2s. 6d., and the gas would not cost him 2s. 6d. The outsiders—what they might call the outscattered districts, where they could not get any gas supplied to them—would have to pay if there were any deficiency. Outside they had a larger area of rateable value, and they would have to pay the greatest of any deficiency that might arise, and the large consumers in the inside had no right to prejudice them in such an important calculation of that nature. He thought the calculations could not have been made with any very great care when there was left out such an important item as the difference between £745 and £3786 on the sinking-fund. From the 129th clause of the new Act they got a benefit for the first time this year, which went very much in the reduction of their rates. The sinking-fund they had to provide for the whole borough was £1364, and if they had had to proceed on the old basis with their present responsibilities, they would have had to provide £6498 as a sinking-fund. That they mainly owed to the operation of their new Act. It was not right for the Gas Committee to take above half of that which had been purchased by the whole town, and appropriate to their own particular advantage a large part, to the advantage of the few in the inside and to the disadvantage of many thousands in the outside.

Mr. GLAISYER thought that if Mr. Marriott carried out his argument to its logical conclusion, he would have supported the amendment, because he told them that, if they took the profit that the gas-works had made—of 5d. per 1000 cubic feet—from the 4s. at which they were supplying it, it gave 3s. 7d. as the cost per 1000 cubic feet. But the price was only 4s. for half a year, and the price, therefore, was not 3s. 7d. for the whole year, but 3s. 5½d.; because they sold the gas at 3s. 9d. for one period; consequently that left 3s. 5½d. as the cost of the gas. If they took the sum of £4600 as the profit they might make available, and if they took 4½d. from the 3s. 5½d., that would leave 3s. 1d., and if they took off the trifling penny extra, they might hope to still have a very good going concern.

Alderman DENHAM remarked that when the matter was before the council on a previous occasion, it was distinctly understood that the gas-works ought to be self-sustaining, and also to be in such a position as to distribute the gas as cheaply and as good as it could be produced, irrespective of what any other town did. As to making large profits to go in reduction of the rates, that, he believed, was altogether wide of the mark of what he believed the gas-works were bought for. If the chairman of the Gas Committee were there, he had no doubt he would bring forward an illustration, which, generally understood, meant that the outside reaped a great advantage from the price of gas compared with what they did before; and the difference was, at least, 25 per cent. If they looked at what they had got from them, they would find that the outside had a very great advantage over the inside, and, while hoping that these matters would be looked at in the light of equity, he hoped also that they would be satisfied to leave a small margin of profit.

After some conversation in respect to negotiations of the corporation in the past with the owner of gas-works at Almondbury, which did not bear upon the question directly before the council.

Mr. STOTT said he thought if they reduced the price of gas to 3s. they would be quite safe, as the price of coal had been reduced a great deal. He did not see why a large consumer of gas should be called upon to pay a considerable sum in order that the town might be relieved of some of its rates.

Alderman HIRST briefly replied, and said there was very little difference between the mover of the resolution and amendment. Mr. Sykes stated that he had no objection to a reasonable profit being made to cover the risk, and that was only what he (Mr. Hirst) wanted. He thought that 3s. 3d. would not be a reasonable amount, and the question was what was a reasonable amount. He considered that it ought not to be reduced to a sum lower than 3s. 6d., and that would enable them to make a couple of thousands profit, which might go in decrease of the rates.

On a show of hands, the amendment was put and negatived, and the recommendation of the committee declared to be carried.

GAS AND WATER AFFAIRS AT BLACKBURN.

PROPOSED PURCHASE OF THE GAS-WORKS BY THE CORPORATION.

A Special Meeting of the Blackburn Town Council was held on Thursday, Sept. 21—Alderman J. PICKOP in the chair—"for the purpose of authorizing the application of funds or rates under the control of the Town Council, as the governing body of the borough, to the promotion by the corporation of a bill or bills in the forthcoming session of Parliament, to obtain powers to carry out a scheme for extending and adding to the water supply of the town by the construction of additional water-works; to extend the boundaries of the municipal borough, by making the same co-extensive with the parliamentary borough; to purchase compulsorily the undertaking of the Blackburn Gaslight Company, and also to determine out of which fund or funds, rate or rates, the expenses of the promotion of the said bill or bills shall be payable, and in what proportions, with a view to submitting any resolution or resolutions to a meeting of the owners and ratepayers, to be called at the requisition of the ratepayers, and to be convened by the mayor."

The CHAIRMAN, in opening the business, said the council were aware that the meeting had been called for a special object, and was one necessitated by the provisions of the Borough Funds Act, by which the assent of an absolute majority of the council, and certain other formalities, were required before the corporation could apply their funds to the purposes intended. This was one of those absurd Acts which were sometimes passed, and which that corporation, along with other corporations, had tried to get repealed.

The TOWN-CLERK then read the formal resolutions on the subject which had been adopted by the Parliamentary Committee. Those relating to the extension of the water-works and the purchase of the gas-works were as follows:—

That it is expedient for the council, as such governing body, to promote in the forthcoming session of Parliament, and that the council do promote accordingly, a bill to be called "The Blackburn Borough Water-Works and Extension Bill" (or such other title as this council may advise) for the following purposes—namely: To enable the council to carry out a scheme, proposed and recommended by Messrs. Bateman and Hill, civil engineers, with such modifications thereof as the said engineers may deem advisable, for increasing the water supply to the borough, and for that purpose to confer powers on the council to construct and maintain certain reservoirs, aqueducts, conduits, and other works in connexion therewith. To obtain powers to enable the council to purchase compulsorily by arbitration, to be conducted in the manner prescribed by the Lands Clauses Acts or otherwise, the undertaking and works of the Blackburn Gaslight Company. To confer borrowing powers on the council to enable them to make all necessary payments in relation to the purchase-money or any sum or sums of money, to be paid to the said Blackburn Gaslight Company, and to enable the council to construct and carry out the aforesaid water scheme. To provide for the dissolution of the Blackburn Gaslight Company, after the purchase of its undertaking and works, by the council.

The CHAIRMAN proposed the adoption by the council of these resolutions, which was seconded by Alderman THOMPSON, and carried unanimously.

STAFFORD WATER SUPPLY.—On the 26th ult., Mr. S. J. Smith, C.E., opened an inquiry at Stafford, upon an application by the corporation of that borough to the Local Government Board for a loan not exceeding £25,000, for the construction of water-works.

LEAMINGTON WATER SUPPLY.—The Town Council have accepted a tender for engines and pumps for the new artesian well supply, which will cost about £9000. It is reported that the quality of the water has been found upon analysis to be excellent.

DESTRUCTION OF PUBLIC LAMPS AT SLIGO.—The gas company of Sligo have offered a reward of £10 for the apprehension of certain "gentlemen" who have of late been amusing themselves during the night in destroying the public lamps. A few nights ago no less than thirty of these lamps were broken; the lamps also in connexion with various places of worship were demolished.

GAS AFFAIRS AT LIMERICK.

The Local Government Commission of Inquiry into the Nature and Management of Corporate Property in Ireland began their sittings in Limerick the week before last. The Commissioners are Mr. UVEDALE CORBETT, chairman; Mr. E. B. LAWLESS, Q.C., and Mr. W. A. EXHAM, Q.C.

One of the principal matters which the commissioners had before them was the question of the corporate management of the gas-works, which have been in the hands of the Town Council since 1853—the corporation supplying gas in competition with the United General Gas Company.

[The following report of the evidence thereon is taken from the Dublin *Freeman's Journal*.]

The first witness examined was

Mr. *John Ellard*, who has been the town-clerk of Limerick since 1858, who, in reference to the gas-works, said the purchase was made in the year 1856, for the sum of £10,000, under the 25th section of the Improvement Act. The name of the original company was the Citizens Gas Consumers Company. When the corporation became the owners of the gas-works, they commenced to work the concern. They supplied private consumers with gas. He did not know if the corporation had derived any profit from the gas-works, but at all events they kept down the price of gas in the city. The Corporation Gas Committee charge 5s. per 1000 feet to private consumers, and so much for each public lamp.

Mr. EXHAM asked if any sinking-fund had been applied to the redemption of the £10,000 which had been borrowed to purchase the gas-works.

Witness said he was not aware. Mr. Spillane, the manager of the works, would be better able to answer questions relative to this subject.

Mr. EXHAM observed that this was one of the subjects which the commissioners would have to fully inquire into. The corporation could not raise the money except by the consent of the Treasury, and it was necessary that it should be allocated under some head or other. It did not appear that the corporation took any action other than relegating their duties to a committee.

Mr. LAWLESS asked whether a detailed account of the receipts and expenditure in connexion with the gas-works had ever been submitted to the auditor, Mr. Pelly.

Witness answered in the negative,

Mr. LAWLESS said that up to the present the commissioners had nothing to show them whether the corporation made a profit on the year or not. He asked: When Mr. Pelly comes here to audit, whom does he require to attend?

Witness: The treasurer and the collector of rates, with some of the other officers of the corporation.

The CHAIRMAN: Mr. Spillane is now manager of the corporation gas-works?

Witness: He is, and all the duties heretofore performed by the committee are now discharged by him. The date of the resolution of the council appointing Mr. Spillane manager, at £300 a year, is June 24, 1875.

Mr. LAWLESS asked when the abstract of accounts of the gas-works was examined?

Witness said the abstract was not examined by the corporation except when a report was brought up for consideration.

Mr. EXHAM said the management of the gas-works was a matter which, in the interests of the public, the commissioners would particularly inquire into. He would like to know where the corporation got authority to nearly double the capital of the gas-works? They were authorized by Act of Parliament to borrow £10,000 to purchase the works, but now it was found to have been increased to £17,736 1s. 9d., besides owing a sum of £14,669 6s. 1d. to the National Bank. Now, he would like to know was it the fact that the corporation, without authority to raise an additional farthing, had nearly doubled the capital of the gas concern, and taxed the ratepayers to that amount?

Witness: If I were to give my opinion, I would say that is the fact.

Mr. EXHAM: Has this matter been ever brought before the council, or before the auditor?

Witness: It has been discussed over and over at the council, but has never been brought before the auditor.

Mr. EXHAM: Can we have the names of the members of the council who from time to time signed the cheques for this £7000 and odd without the slightest authority?

Witness: Oh, yes; I can let you have the names.

The CHAIRMAN said they were given to understand that the sum of £10,000, which it was agreed to pay for the gas works, had been reduced to £7000; but instead of the debt being diminished, it appeared that the debt on the works had considerably increased.

Mr. EXHAM said it would have been better for the ratepayers to let the £10,000 paid for the gas-works go to the dogs than that they should have been worked, as was proved, at a continuous loss.

Witness: I can furnish you with documents showing the reports and accounts of the Gas Committee while the works were under their management. I do not know who appointed the auditor who examined the manager's accounts, nor do I know who appointed him. I recollect that the rival gas company at one time offered to buy our works, and offered to guarantee that they would never raise the price for gas above 5s. per 1000 cubic feet. The Act of Parliament restricted us also to that figure.

Mr. EXHAM: The corporation had no power to mortgage the gas-works, and yet the works owed to the bank £14,000. What security did the bank get? It seems very strange indeed.

Witness: I think the Gas Committee gave bills for the money.

Mr. EXHAM: Oh, very well, that is their matter; but what authority had they to get into debt to the extent of £14,000? For I take it there was no borrowing clause in the bank mortgage on the works for £5000.

Witness: I think not.

Mr. LAWLESS: Furnish us with all the documents calculated to throw light on this subject.

Witness: I will.

On Friday, Sept. 22, Mr. *Pelly*, the Local Government Board auditor, was examined, and in the course of his evidence he said: The gas accounts never came under my official inspection. I am not aware that the capital liabilities of the gas-works have been raised from £10,000 to £17,000 odd, exclusive of a debt of over £14,000 due to the National Bank.

Mr. LAWLESS: I want to know what documents were produced that enabled you to pass this £1748 1s. 10d. for the lighting of the city.

Witness: I saw the contract.

Mr. EXHAM: But we have been told that there is no contract.

Witness: I was shown the resolution of council authorizing the Gas Committee to light the city.

Mr. LAWLESS: Do you think if any other company were lighting the city the corporation would allow them an increase per lamp in consequence of the rise in the price of coal, and the other reasons mentioned?

Witness: Well, I cannot say. I was instructed verbally by the Local Government Board, that I had no authority to go into the Gas-Works or Market Trustees accounts.

On Saturday, Sept. 23, Mr. *William Spaight*, J.P., said he attended this inquiry as he had heard that a statement had been made with reference to the purchase of the gas-works, which affected his reputation as a former member of the Town Council. As he was in town that day, he would, with the permission of the commissioners, like to be examined on the subject, as possibly he would be unable to be present when the commissioners sat the following week.

The CHAIRMAN: I will be most happy to receive the evidence of any gentleman desiring to come forward.

Witness: I heard a statement made that the corporation were unanimous in purchasing the gas-works, and that all parties in the corporation who represented the property and trade of Limerick were unanimous in recommending the purchase. At that time I was a member of the Town Council, and I came in——

The CHAIRMAN: Were you an alderman or a town councillor?

Witness: A town councillor; I never got promotion. When I came into the council chamber, I found the question of the purchase of the gas-works under discussion; in fact, I was brought down by one of the principal proprietors of the gas-works to vote as a town councillor for the purchase by the corporation of a ricketty, worn-out, insolvent concern as it then was.

The CHAIRMAN: Were you requested to vote in favour of the purchase of the gas-works?

Witness: I was brought down to do so by one of my principal supporters in the ward; but when I learned what the facts were, I astonished my supporter immensely by arguing, and voting, and protesting against the purchase of the gas-works; I believe I was alone in so doing. Who were present I cannot say, but the books of the corporation will tell you, and also when the discussion took place.

The CHAIRMAN: May we infer that you lost the support of that gentleman, your supporter, at the next election?

Witness: He was a Quaker, sir, and he almost gave me his curse; he came down to see me vote in favour of throwing away the public money, and he witnessed me voting the other way.

The CHAIRMAN: Can you tell us briefly the reason why you acted so directly against the wishes of your friend?

Witness: The reason was because I found it was worked by gentlemen for their own individual profit, and that the corporation were about to give £10,000 for a concern which I was told was not worth one-fourth part of the money.

The CHAIRMAN: Was it mentioned at the time, Mr. Spaight, as we have been told, that a much larger sum was offered for the works by the English company, and do you believe such to be the fact?

Witness: I do not know if the offer was made; subsequent to that I heard of it.

The CHAIRMAN: No such offer was ever brought forward in writing?

Witness: I never heard of it. I have no recollection of such.

The CHAIRMAN: You were present at the discussion?

Witness: I was.

The CHAIRMAN: Then, Mr. Spaight, are you aware, independent of yourself, if private canvassing was actually going on by the owners of these gas-works with a view to inducing the corporation to purchase the concern?

Witness: I do not know, but I heard that it was so; I heard that some owners of the gas-works were members of the corporation. I would have been quite willing to vote for the purchase of the works if I could do so with ease to my conscience.

Mr. EXHAM: Your conscience must have been a very strong one, Mr. Spaight.

Witness: Well, it is not a very strong one.

The CHAIRMAN: Have you taken any interest in the affairs of the corporation since?

Witness: Not since I was thrown out.

The CHAIRMAN: You were a candidate at the next election?

Witness: Oh, I was a member of the Town Council for a long time after; that had nothing to do with my being turned out, which was in consequence of a little touch of the religious element. I was not a member of the Gas Committee; but after the purchase of the gas-works, and during the time I acted as Town-Councillor, the concern was always swallowing up money. I am pretty certain that the corporation were advancing money from the time of the purchase until I left the council.

Mr. *Ambrose Hall*, J.P., and ex-Mayor of Limerick, stated: I was Mayor of Limerick last year; Mr. Cleary was my immediate predecessor.

The CHAIRMAN: On what points, Mr. Hall, are you desirous of giving evidence?

Witness: I am not desirous to give evidence on any point. I am here merely in obedience to a summons which I have received from you.

The CHAIRMAN: Can you give us any evidence with respect to the management of the gas-works?

Witness: I was never a member of the Gas Committee, and though asked to act on it, I declined to do so. In fact, I and the Gas Committee were always at sixes and sevens.

The CHAIRMAN: In your opinion, has the purchase of the gas-works been a profitable arrangement for the city of Limerick or otherwise?

Witness: I do not know much about the purchase, but shortly after I entered the council I had reason to find fault with the management of the gas-works; I may say that I frequently found fault with it.

The CHAIRMAN: How long were you a member of the Town Council?

Witness: I was a member of the council for about 14 years; I became a member some time after the purchase of the gas-works by the corporation.

The CHAIRMAN: Is it within your knowledge that cheques have been signed by members of the Town Council, for the purpose of supporting the gas-works?

Witness: I am aware that sums have been granted by the corporation from time to time for the purchase of plant, &c., for the works, as the case might be. I took an active part in opposing these advances, and on one occasion where the corporation wanted to borrow money from the bank, I served notices myself to the managers, and the consequence was that the bank refused to give the money. The corporation then memorialized the Lords of the Treasury, and I took an active part in getting up a counter-memorial. The corporation wanted to get permission for the bank to advance them a loan of £5000, for the purpose of carrying out repairs at the gas-works, and putting them in good condition.

The CHAIRMAN: Did the corporation obtain the permission of the Lords of the Treasury?

Witness: I think a public company or a public body never got such a slap in the teeth as this corporation got when the Lords of the Treasury had received the counter-memorial from the ratepayers. They stated that the corporation had not proved their case, and so the Lords of the Treasury refused the money.

Mr. LAWLESS: In what year was this?

Witness: I think it must be some 12 or 13 years ago. We were on the eve of a general election, or, at least, one was to come off immediately after, and, owing to this circumstance, the corporation succeeded in getting the money. The corporation were in the first instance peremptorily refused by the Lords of the Treasury, but shortly after, to my surprise, and that of others, who, like myself, were interested in the matter, the council got leave to borrow the money.

The CHAIRMAN: From whom?

Witness: From the Lords of the Treasury, as we believed. At the time we were, as I have said, on the eve of a general election, and Limerick had then two thorough Whig representatives; the Whigs were in power, and it would never answer them, with two Whigs representing Limerick, to refuse the corporation a paltry £5000.

The CHAIRMAN: Are the records of this transaction on the books of the corporation?

Witness: I think they are.

The CHAIRMAN: Have any grants been made for the use of the gas-works by the corporation after that?

Witness: They have, and I totally objected to their being made; when the

Lords of the Treasury gave permission to borrow the £5000, they imposed a condition that a sinking-fund should be provided.

By Mr. EXHAM: That sinking-fund was not provided. I may be able to get you a copy of the memorial and counter-memorial to the Lords of the Treasury. I found it useless to say anything against advancing money for the use of the gas-works. There was a party in the council, and if I said the sun was shining they would assert that it was not.

By the CHAIRMAN: During the time I was member of the corporation there was no money set apart for the providing of a sinking-fund to pay off the £5000. It does not surprise me in the least that the capital account of the gas-works has increased from £10,000 to over £32,000. I own some property in the city, and I am perfectly aware that the capital account has been increased; some of the money for the gas-works was put on the rates, but whether it was paid to the committee *in globo* or gradually I do not know. I invariably objected to the advances being made. I often wanted, at the meetings of the council, to have the minutes of the Gas Committee read, but to no purpose; indeed, on one occasion, I recollect when the Gas Committee's minutes for seven years were taken as read. After two years discussion, I compelled the then chairman of the Gas Committee to resign, his reason being evidently that he began to think my facts and figures were becoming a little too heavy for him. Mr. Spillane was appointed manager of the corporation gas-works during my mayoralty, and his returns since have corroborated the statements I so frequently made. I have heard Mr. Spillane on more than one occasion speak at the council in favour of an effort being made to make the works a paying concern. He was always advocating a change in the system, and on one occasion he recommended the appointment of a manager. At that time Mr. Spillane had no notion whatever that the council would have appointed himself manager. While he was chairman of the Gas Committee, he very often complained of the way in which the works were managed. I remember an offer being made by the English company to purchase the gas-works, and I was in favour of it. I was opposed, and certain members of the council wanted to make out that I was a paid member of the company. The fact is, that a man in Limerick requires a great deal of moral courage to state what he believes to be right.

By Mr. EXHAM: During my mayoralty I made some statements with reference to certain members of the Gas Committee taking property out of the concern for less than its value, and one of the gentlemen whose names I mentioned has since served me with a writ. I am awaiting the trial.

Mr. EXHAM: Do you recollect an offer being made on the part of this other company to light the lamps of the city for £500 or £600 less than the corporation, and also a promise to supply private consumers at 5s. per 1000 feet, giving a guarantee that the price would not be raised?

Witness: I believe an offer of that kind was made; but I do not know if it came formally before the council.

Mr. *W. M'Donnell*, treasurer to the corporation, in the course of his examination, said: I never countersigned cheques to subsidize the gas account; I know nothing of that. I am present at all the meetings of the corporation. I was at one when a sum was voted in aid of the gas-works; the amount was £400, the first instalment of a total sum of £2100. That instalment is not yet repaid.

Mr. CONOLLY: That sum was voted for improvements in the gas-works, as the United General Gas Company would not sell their works to us. The opinion of the ratepayers was not taken on the subject of buying up the works of the United General Gas Company.

Witness: No cheques have yet been issued for any portion of the £2100, and this is the only monetary transaction I was engaged in with respect to the gas-works. The corporation get £5 each for the public lamps per year.

The CHAIRMAN: That is nearly double what the other company got. You granted an additional £1 for each lamp when coal was dear; but you did not strike it off when coal got cheap.

Witness: The additional grant was £197, and the council considered they should continue it, as the coal had not sufficiently fallen in price to justify their taking it off.

Mr. EXHAM: But coal has fallen, and yet the extra £1 is still paid.

On Tuesday last the inquiry was resumed and concluded.

Mr. *William Spillane*, J.P., stated: I have been manager for the last twelve months of the gas-works; before that they were managed by a committee. I was a member of the committee, and was so for seven years. During that time I had an opportunity of knowing how the gas-works were managed. The gas-works were purchased under the 62nd section of the Act of 1853. The corporation, under that Act, were privileged to supply gas to consumers on such terms as should be agreed on. In order to make the purchase, they were empowered to borrow £20,000, to be charged to the improvement-rate. The works were mortgaged for £10,000 on the improvement-rate. The gas-works were owned originally by a private company which were called the Limerick Gas Consumers Company. The various grants advanced by the corporation for the support of the works from the time of purchase in 1856 up to 1868 amounted to £7331 1s. 9d. During the year 1857 their grants amounted to £2,915 16s. 1d, consequent, no doubt, on the condition in which the works were, as described by Mr. William Spaight. In 1858 the grants brought the capital account up to £13,050. In June, 1856, there was a grant of £159, and in December, 1856, there was another grant of £150. In June, 1860, there was a grant of £150; and in December, 1860, there were three grants—one for £150, another for £40, and another for £90. In 1862 there was a grant in the February of that year of £140 10s.; in June a grant of £9 16s. 10d.; another of the same date of £6 10s.; in December, 1862, there was a grant of £24 18s. 3d.; in June, 1863, there was a grant of £1000, and a further grant in the same year of £308 11s. In 1864 there was a grant of £9 8s. 10d. The aggregate amounted in December, 1871, to £19,600 11s. 10d. That would make the entire grants amount to £9600 11s. 10d.; the last item I gave of £19,000 was the application of the funds; the items I gave of the different years were grants in aid.

By Mr. LAWLESS: In addition to the £10,000 assured to the original owners of the gas-works on the improvement-rate, a sum of £7331 was advanced by the corporation in aid of the works. In my statement respecting the works, in March, 1876, I state that the council have paid for the redemption of some of the original bonds, part of the £10,000 and £2280, thus making a total of £9619 paid by the people in aid of the works. All the grants made have been authorized by resolution of council. The minutes of the Gas Committee for the years 1857 and 1858 were read in council and confirmed. Some of the books of the Gas Committee, subsequent to this, are missing. The condition of the works in 1856 necessitated the large expenditure of £2916. Mr. William Spaight has graphically described the condition of the works in that year—rickety, worn out, and, I believe, he made use of the word "rotten." The grants were invariably made in open council. The corporation never entertained the shadow of a doubt that the improvement-rate was not available for the purpose of increasing the capital of the gas concern; in point of fact, the purchase of the works would be a nullity if the corporation could not put themselves in a position to work the gas concern. The then law adviser to the corporation was of opinion that the council had full power to advance the money on the improvement-rate to work the property. All the advances of £14,000 from the bonds were made to the gas-works on bills signed by members of the council. The National Bank have a mortgage on the improvement-rate for £5000. The grant of £7331 1s. 9d. was absolutely required for the gas-works. During the time it was made the Gas Committee would not otherwise be in a position to work the property. The Gas Committee furnished a report to the council every year. Sometimes the books of the corporation stated this, and it was invariably ordered, when the Gas Committee brought up their report to the corporation, to have the report printed and circulated amongst the members. Mr. Spillane read a resolution proposed in 1858 by Alderman Watson, and seconded by Councillor Ward, in which the corporation thanked the Gas Committee for their able management of the gas-works, which had proved of such advantage to the citizens.

Mr. LAWLESS: It is very curious that in that year the corporation should have made a grant of over £800 to the Gas Committee for the carrying on of the works.

The CHAIRMAN: And when the works were in the state described by Mr. Spaight.

Witness: The proposer and seconder of that resolution were men who had a very large stake in the city. On Sept. 17, 1863, I find a minute of a resolution, proposed by Mr. Hall, and seconded by Alderman Carte, to have the accounts of the Gas Committee audited by a professional accountant; and to report some means by which they could be relieved of the cost of supporting the works. To that resolution an amendment, was proposed by Mr. M'Sheehy, and seconded by Mr. J. Spaight, that having heard the chairman's explanation, the council were satisfied with the action of the Gas Committee, and thanked them for their labours. Alderman Carte having, after this, declined to second Mr. Hall's proposition, the motion fell through. I do not interpret that resolution as meaning that the accounts were not previously audited. I cannot say what the corporation did with the gas accounts after they were sent in, beyond that they sometimes ordered them to be printed. Any year that a loss was incurred in the management of the works, the Gas Committee duly informed the council that such was the case. When I was chairman of the Gas Committee, reports were furnished regularly to the council on the condition of the gas-works.

Mr. *James Spaight*, J.P., and the president of the Chamber of Commerce, believed that the management of the gas-works by the corporation had proved most disastrous to the ratepayers of Limerick.

At the commencement of the sitting on Wednesday last, Mr. *Spillane* requested to be allowed to set the commissioners right with respect to a matter which he thought had not been placed correctly before them. In his evidence the previous day, Mr. Spaight seemed to imply there was no paid manager of the gas-works until he (Mr. Spillane) was rather surreptitiously appointed. It was not so; because from the time the gas-works were purchased until April, 1875, the corporation had a paid manager over the works. It was hardly fair for any member of the corporation, when he could at any moment have objected to his (Mr. Spillane's) appointment, to keep this stone in his sleeve for a period of 14 months, without ever offering so much as an objection.

The CHAIRMAN said he and Mr. Lawless were under the impression that there had been no paid manager of the works up to the time of Mr. Spillane's appointment. However, they would take on their notes that such was not the case.

Mr. *Richard Phillips* stated: I have been a town councillor since last year. With reference to the gas question, I am a local director of the United General Gas Company, but not the agent. Any observation I may make with reference to the Corporation Gas-Works will not be biassed through my connexion with the United Company. I believe the corporation acted wisely in purchasing the gas concern, as otherwise they might have come into the possession of the United Company, who would have had a monopoly of the lighting of the city. My objection to the way in which the Corporation Gas-Works are managed arises from matters which have occurred since the purchase. In 1858 the United General Gas Company offered to light for three years the public lamps of the city, from dusk to daylight, at £3 per lamp per year, and at £2 15s. per lamp if they were allowed to extinguish the lamps before daylight. Had that tender been accepted, the city would have since saved a sum of £10,000.

Mr. *Spillane* read the minute of the meeting of the corporation when the tender from the United General Gas Company was received. A sum of £700 was voted for the half year's lighting of the city lamps, and on a division a sum of £650 for the extension of mains. There was a direct refusal by the corporation to accept the proposal of the United General Gas Company. Mr. William Spaight, who was at the time a member of the corporation, acquiesced in the motion to give the lighting of the city to the corporation committee.

The CHAIRMAN: It does not appear that the corporation took any notice of the offer from the United General Gas Company; they simply gave it the go-bye.

Mr. EXHAM: It was dealt with, I suppose, after the same manner as the corporation disposed of the seven years gas minutes—"taken as read."

Mr. *Phillips:* In 1864 the corporation succeeded in getting a loan of £5000 for the gas-works, and the moment they got hold of the money they clapped on £300 extra for the lighting of the city lamps, and continued the charge until 1873, when they got an additional pound per lamp; in fact, the United General Gas Company were made a bugbear of, and the people were continually reminded that if they did not support the corporation gas-works, they would be helping to create a monopoly in the lighting of the city. With reference to the charge which had been made for the lighting of the public lamps, I find by referring to the books of the United General Gas Company that they only charged, from 1824 to 1841, £3 4s. for the lighting of each lamp.

Mr. EXHAM: What is the charge made to private consumers during that period?

Mr. *Phillips:* It has been stated over and over again that the charge to private consumers was 15s. per 1000 feet, but the late manager of the United Company's Gas-Works swore in the House of Lords, and challenged any one to prove, that they ever charged more by meter than 10s.; it was only about the time the two companies came into competition that meters were being introduced, and it was the introduction of meters more than anything else, I believe, which led to the reduction in the price of gas; the meters were the real cause of the reduction, and not the patriotic efforts of the corporation.

Mr. EXHAM: Was there a fresh offer from the United General Gas Company in 1864?

Mr. *Phillips:* There was, sir; the United General Gas Company offered to rent the gas-works at £1000 a year and light the lamps of the city, but I am not aware if any answer was received to that; what the public should know is this, that they have been frightened at the prospect of creating a monopoly, and by this means the corporation were unable to vote grants, from time to time, to carry on their gas-works; besides, every year the Gas Committee were bringing up a hopefnl report of the concern.

The CHAIRMAN: The United General Gas Company go by the name of the English company?

Mr. *Phillips:* Yes, sir; they go by every name; they go by the name of the English company, and sometimes by the name of the "alien company."

Mr. *Spillane:* I have not heard the company designated the alien company during this inquiry. They were alluded to as the English company, and they are an English company.

Mr. *Phillips:* I will show you how the accounts of the Gas Committee were kept, and presented to the corporation. I find that in the year 1867 the chairman of the Gas Committee brought up a report on the state of the property, in which he showed a profit, and went on to say that the works were deserving of every support from the citizens generally. In this year the Gas Committee showed a gross profit of £1306 15s. 8d. on the year's working, whereas there was an actual loss that year. The Gas Committee, to show that there was a profit, adopted the desperate remedy of putting in as revenue a grant from the corporation. This was a wilful deception of the citizens. I do not blame the council for not accepting Mr. Somerville's proposal, nor for purchasing the

gas-works, but I do blame the corporation for not accepting the offers made some years ago by the United General Gas Company, and the intimidation used to prevent any interference with their gas-works. Mr. Hall was perpetually protesting against the grants, and warning the council against making them; but he was only called a spy, and such like names. By refusing to accept the offer of the United Company in 1864, they had lost since a gross sum of £47,000. There was one thing on which he had heard nobody offer any suggestion, and that was the placing the corporation, in respect to financial matters, under the control of some body like the Local Government Board.

The CHAIRMAN: The accounts are at present audited by the auditor of the Local Government Board.

Mr. *Phillips* thought that was not sufficient, for he held that it should not be left with the corporation to impose whatever tax they liked for the lighting of the city.

This closed the evidence on the gas question.

BURGHS GAS SUPPLY (SCOTLAND) ACT.

ADOPTION OF THE ACT IN DUMFRIES.

A Special Meeting of the Dumfries Town Council was held on Friday, Sept. 23—Provost SMITH presiding—for the purpose of considering a notice of motion given by a member of the corporation, that the burgh should adopt the provisions of the Act of last session.

Mr. WOOD moved a resolution to that effect, and in doing so said: When the question of purchasing the gas-works was before the Town Council, a few years ago, the feeling inside the council, and amongst the general body of the people, was strongly in favour of the scheme; but the fact of being obliged to obtain a special Act of Parliament, at considerable expense, in order to carry through the transfer, deterred many from giving to the movement such a hearty support as they would otherwise have done; and, in consequence, the scheme was temporarily abandoned. In the course of this year, however, Parliament has passed a general measure for Scotland, entitled the "Burghs Gas Supply (Scotland) Act, 1876." The object of this Act is to enable burghs in Scotland to take over existing gas-works, or "to erect, lay down, improve, extend, and maintain gas-works, gasometers, and pipes for the distribution of gas, and execute all such works as may be necessary for the efficient manufacture and supply of gas for public and private purposes, and to purchase, acquire, and hold lands and other property for these purposes, and to carry on any such operations and business as are usually carried on by gas companies," and for the purposes of purchase or erection of works the necessary borrowing powers are conferred. This Act, which enables burghs in Scotland to do what could only formerly be done by going to Parliament for a special local Act, at a very large expense, even when unopposed, I now ask this council to take the first step towards adopting. Before bringing under your notice some of the beneficial results attendant upon transfers of gas-works to local authorities, I may be permitted to point out the necessity which exists for, and the benefit which may reasonably be hoped to be derived from, the transfer of the gas supply to the Town Council. As to the necessity, in the first place, I do not require to tell you that the supply is at present a monopoly owned by a few, who give us good or bad gas, dear or cheap gas, just as they please; and, however much we may have reason to complain, they hold the vast gas-consuming public entirely at their mercy. In the adjoining burgh of Maxwelltown the full force of this was a short time ago experienced by the Police Commissioners, who were nearly compelled to revert to the use of oil in the public lamps. So indispensably necessary in every shape has gaslight become, that the monopoly of its manufacture and supply is fast becoming entirely out of the question, and the whole spirit of modern legislation is tending towards the stamping out of such a state of things, by making provision for placing in the hands of the ratepayers themselves the entire control of its management and production. Then as to the benefits likely to be derived by the public from such a transfer. I think it will be generally admitted that, where a public necessity like light is concerned—and no one can deny that a good and cheap supply of gas belong as much to the responsible organization of a town as an efficient system of drainage or a supply of pure water—the placing of its control in the hands of the people themselves is the best means of ensuring to each consumer a supply of good light at as nearly cost price as possible, thus saving these large dividends which annually go into the pockets of the gas companies. There is no question that, wherever the management of gas-works has been carried on by a public body, it has never been found necessary to relinquish it; and these remarks are intended as a reply to any who may be disposed to say that companies can manage gas-works more economically than corporations. Such a contention is utterly indefensible, and no better reply to it can be found than to point out what has been the practical result in every case with which I am acquainted, by quoting the prices of gas in the following places, in all of which the gas supply is managed by the corporation or local authority. This information I have obtained since our last meeting, by corresponding directly with the management in each place. In the following cities and towns in Scotland the prices per 1000 cubic feet are as follow:—

	s.	d.		s.	d.
Glasgow	4	2	Greenock	4	7
Perth	4	7	Paisley	4	2
Aberdeen	4	10	Forfar	4	9
Kilmarnock	5	0	Dundee	4	2

In the following cities and towns in England, which are likewise under corporation management, the prices per 1000 cubic feet are:—

	s.	d.		s.	d.
Workington	4	7	Oldham	4	6*
Macclesfield	4	0	Knaresborough	4	2
Southport, less 5 per cent.	4	0	Salford	4	0
Beverley	4	2	Rochdale	4	2
Newton (Lancashire)	4s. to 4	3	Halifax	3	8
Cleckheaton	4	2	Manchester	3	6
Ripon	4	7	Bury	3	11½
Great Malvern	4	6	Bradford	3	4
Birmingham	2s. 7½d. to 3	1	Leeds	3	3
Bolton	3	9	Middlesbrough	3	0
Doncaster	3	9	Stockton	3	0
Huddersfield	3	7	Darlington	3	0
Nottingham	3	2	Burnley	3	0
Rotherham	3	3	Carlisle	3	0
Stockport	4	0	Newcastle-on-Tyne	3	0†
Walsall	2	5			

* Ten per cent. off, or 4s. 2d. net. † Ten per cent off, or 2s. 8½d. net.

The true commercial value of gas is its value to the public, and this is dependent in a great measure upon its illuminating power. With a view to ascertain the quality of the gas supplied to the consumers of Dumfries and Maxwelltown, a gas-testing station, fully equipped, was, as you are aware, established some six months ago, and the results have from week to week been published. A regular report-book is kept in the station, and I have gone back over this for the six months from the 7th of March till the 9th of September, 1876, and I find the average illuminating power for that period (being the result of 72 different testings) to be 21·77 standard candles. During the greater portion of this time the price was 6s. per 1000 cubic feet—the price having only recently been lowered to 5s. 10s.—"the smallest reduction which," says the Scotch correspondent of the JOURNAL OF GAS LIGHTING, in a recent number, "I have yet had to chronicle." The average illuminating power and prices of the gas supplied in the following places in Scotland, where the works have already been transferred, as ascertained from time to time during the last six months, is as follows:—

	Average Illuminating Power.	Price per 1000 Cubic Feet. s.	d.
Perth	28·18	4	7
Greenock	29·43	4	7
Aberdeen	29·00	4	10
Kilmarnock	28·50	5	0
Paisley	28·13	4	2
Dundee	27·83	4	2½ net.
Glasgow	27·43	4	2

This gives an average illuminating power over the whole of 28·35 standard candles, at an average cost of 4s. 5d. per 1000 cubic feet. Then, if gas with a luminosity equal to 28·35 is charged at an average of 4s. 5d., what would be the charge for gas of equal quality with that supplied in Dumfries during the last half year—viz., 21·77 candles? This is entirely a question of simple proportion, and proves the value of Dumfries gas to be under 3s. 5d. per 1000 feet; whereas, we are now being charged 5s. 10d., and until very recently 6s. Assuming the quantity of gas consumed in Dumfries and Maxwelltown to be 25 millions, the loss to the consumers is thus shown to be over £3000 every year. Gentlemen, this is a serious consideration, affecting directly and indirectly every member of the community. It is for us, as the representatives of the public, to say whether by inaction we shall continue to bolster up this unhealthy and undesirable state of things; or, by taking advantage of the recent legislation, which enables us to do so, break down a monopoly which has already existed too long. Why should we calmly submit to inferior light at an exorbitant price without stretching out a hand to help ourselves? Why should we consent to remain in a condition from which it is now such an easy and inexpensive manner to be free? Dumfries is not a place standing still; the rapidity with which the town is extending, the flourishing condition of our industries, and many other nameless proofs, must convince all how steadily the tide of progress is flowing here, and this we are not entitled to obstruct; nay, more, we are surely called upon by every means in our power to make that progress permanent. Here we have an opportunity; and it is now our own fault if we do not embrace it, and be the means of introducing at a cheapened rate a supply of clear, good light to illuminate our factories, shops, streets, and dwellings, instead of paying nearly double value for a light which at times has been but little more than sufficient to make darkness visible. I conclude by moving that the council resolve to adopt the Act.

Mr. MUIR seconded the motion. He was happy to think they would be unanimous that day; but what he desired to point out was this, that though the Act might be adopted, and confirmed at the adjourned meeting, which must be held after the November elections, the council did not necessarily incur the responsibility of giving effect to the provisions of the Act, unless they were encouraged to do so by the ratepayers; for even after its adoption was confirmed by the council, the ratepayers might, according to an admirable provision, put a veto on the whole proceedings. The provision he referred to was this, that if, after the adoption was confirmed, any considerable portion of the ratepayers objected, twenty of them might lodge a remonstrance with the town-clerk, when the Provost would be bound to take a poll of the ratepayers on the question. He would not complain against such a remonstrance. Indeed, he hoped it would be made, for it was extremely desirable that in a matter like this their hands should be strengthened by a direct vote of the community.

The CHAIRMAN: Is there any amendment?

Mr. PATERSON said he had no amendment to propose, but thought it would have been better had they had twelve months to consider the matter, so that all parties might be well advised regarding it. Seeing the ratepayers were not likely to be in possession of the Gas Act, he trusted the newspapers might see it to be consistent with their convenience to give a slight digest, not only of the Act itself, but also of the other Acts recited in it. He could not disguise from himself that it appeared hasty to adopt the Act at this time, for he was persuaded that many of the councillors had never had an opportunity of seeing those recited Acts, in which there were many provisions of considerable importance. Take for example the Gas-Works Clauses Act of 1847, which imposed certain duties on the Commissioners of Police; the Commissioners Clauses Act of 1847; the Lands Clauses Consolidation Act, 1845, and Amendment Act of 1860. All these Acts contained provisions which would require to be attended to, as they were incorporated in this Gas Act. There was one provision of the Act itself which he would have them consider most carefully. He referred to the 38th section, which left them no option but to establish a guarantee-fund. It set forth not only that "it shall be lawful for the commissioners," but that "they are hereby required" to form such a fund. The words were: "It shall be lawful for the commissioners, and they are hereby required from time to time to fix, impose, and levy such a rate, to be termed 'The Gas Contingent Guarantee Rate,' as may be required to pay any annuities, and any interest due thereon, and the interest of money borrowed, or to be borrowed, under the provisions and for the purposes of this Act." Now, that guarantee-rate was to be levied only within the police boundary; and that being so, parties living beyond that boundary and consuming the gas would not be chargeable with the guarantee-rate. The consumer inside the boundary would, therefore, be entitled to say that those consumers who resided in the outlying districts were receiving advantages which he did not possess. No doubt that could be somewhat rectified by making the price of gas a little higher to the consumers outside the police boundary.

Mr. MUIR: Read clause 41, regulating the price of gas.

Mr. PATERSON: It is to the effect that you are bound, within the district in which the Act is adopted, to charge a uniform price; but it does not follow from that, that you may not charge a higher price for gas consumed outside the district.

Mr. MUIR: You are wrong, however, in supposing we are bound to have a guarantee-fund. You may have it; but you have power to make the price of gas such as to cover all expenses.

Mr. PATERSON: Most decidedly you are bound to have a guarantee-fund.

Mr. WOOD: Most decidedly not.

Mr. PATERSON read the 38th clause again, and maintained that according to it they must have a guarantee-fund. If they were to borrow £20 000, with which to purchase the present company's works, they would require to lay by £500 a year as a sinking-fund to meet the interest and to pay annuities. But if the Act was to be an advantage to the public, he had no objection to see it adopted and in operation to-morrow.

Mr. LENNOX pointed out that this or a similar guarantee-fund was provided for in all the gas Acts which had ever been passed. Its sole purpose was to give security to persons from whom money might be borrowed. Arbroath was the only place, however, where such a fund had been formed. But between that case and this, though the guarantee clauses were almost identical, there was an essential difference, for while by this Act they could increase the price of gas every six months, to provide for any deficiency that might have arisen, the price of gas was arbitrarily fixed at 5s. 10d. per 1000 feet by the Arbroath Act, and during the high price of coal the authorities incurred a debt which

they could not wipe off by increasing the price of gas, but only by a special rate for the guarantee-fund.

Mr. SMYTH said it was necessary to have a rating clause in order to enable them to borrow money; but there was one provision of the Act which might operate unfairly. It was this: Suppose a number of people declined to burn gas, they would still have to pay the rate for this guarantee-fund. It might be said that under the Water Act parties who did not use the water were yet subjected to the rate. But in that case they were receiving a public sanitary benefit in the flushing of the drains with water.

Mr. MUIR: And is there not a public benefit in the street-lamps?

Mr. SMYTH: Yes, but the public pay for that benefit. It is a different thing altogether. Under this Act the gas in the public lamps will have to be paid for, notwithstanding the universality of the rate. However, he would not stand in the way of the adoption of the Act, though he would reserve his right to object to future proceedings. If, for instance, it were proposed to buy the present company's works, he would hold himself free to object.

Mr. MUIR: We all do that.

Mr. SMYTH: To buy those works might be to do a great wrong to the public. They did not know what condition the pipes were in, and he would prefer having new works, built on a site near the railway, from which a service rail could be run, and the cost of carting coal—£300 or £400 a year—be saved.

Mr. NICHOLSON thought it was premature to discuss those matters at present. As for the guarantee-fund, how was it possible that an assessment could be required for any other purpose than merely to give security to the lender in the event of money being borrowed, when they had power to pay off all expenses by putting them on the price of gas? This was very evident from the 41st clause, which was as follows:—"The commissioners shall from time to time fix the price to be paid for gas to be supplied during any succeeding year or half year, and until such price be altered by the commissioners, the price so fixed shall remain in force, provided that the prices shall be such as will, as nearly as can be estimated, raise sufficient income to discharge all the costs and expenses of, and incident to, the manufacture and distribution of the gas made, together with the interest on all money borrowed in respect of the works, and to provide the sinking-fund required by this Act; and to provide for a depreciation and renewal fund, sufficient to maintain the works in perpetuity, and for all charges incident to the occupation of such works." According to that clause, if they found at the end of the year, after paying all expenses and meeting all claims, there was a balance on the wrong side, all they had to do was to add to the price of the gas. The question at present was not whether they should buy the old gas-works or construct new ones, but whether the community of Dumfries should have an opportunity of objecting to or confirming the principle that the supply of gas ought to be in their own hands; or, as hitherto, be a monopoly in the hands of a private company.

The CLERK: Do you wish the operation of the Act limited to the police or the royal boundary?

Mr. PATERSON: The police boundary.

Mr. WOOD desired to have the matter put right before the public, and not as twisted and perverted by Bailie Paterson. He contended that the rating power was there only as a security to creditors and to be used only when everything else failed, as was shown by the name of the fund—"*contingent* guarantee-fund." This Act had been framed on the model of several special gas Acts, and what Mr. Lennox had said of the rating clause was perfectly correct. There was a similar clause in all those Acts; but it was only at Arbroath, where there was no power to increase the price of gas, and where a deficit was caused during the coal famine, that a rate had ever been imposed. There, too, the rate was only 2d. in the pound for the year, and the people could not complain when they had been burning gas at a low figure during the high price of coals.

Mr. SMYTH: When is the contingency to warrant the rate to arise, then?

Mr. WOOD: With us it will never arise.

Mr. SMYTH: It will arise before we can take a single step; for we will have to borrow money.

Mr. MUIR objected to Mr. Smyth reopening the discussion after the reply had been made; and

It was agreed to meet to confirm the above resolution on the first Friday in December.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The iron trade proper does not alter materially week by week, nor does it seem probable, judging from present appearances, that any change will take place in the immediate future. Pig iron has not at all increased in value, notwithstanding the firmness which at present characterizes the Scotch market of that class, several parcels of local production having changed hands during the week, at the rates ruling for some time past. In forge iron the sales are very slow indeed, most of the iron-works devoted to that sort of work being but very poorly engaged.

In some other departments of local industry there is, however, a distinct improvement, in a measure which is highly cheering to those engaged in other branches of trade. The steel rail mills, for instance, are now doing a very fair amount of business, and in the cutlery branches there is a clear amendment.

Merchant irons of all classes are almost wholly neglected, nothing but really best bars for converting into cast steel being asked for. "J. B." bars for this and other purposes range from £9 to £9 10s., whilst foreign irons of Swedish and Russian brands are quoted £15 to £17, according to their respective qualities.

In the brass trade at Rotherham there is some little growth of activity, and an influx of orders, which promises well for the employment of the men of the chief firms at Rotherham. At Sheffield, the brass manufacturers are, perhaps, not quite so well off; but they are, nevertheless, producing a fair amount of business in the line peculiar to plumbers requirements.

The house coal trade is rather better, owing to the incoming of colder weather; but, despite that fact, prices are very quiet. Steam coal is also selling more freely; but the consignments which are being sent off to Goole, Grimsby, and Hull are just now, for the most part, for shipment to the Baltic ports, which will shortly be closed by ice. Gas coal prices are steady.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

A good many inquiries continue to be made in this district for gas-making coals, and although the bulk of the companies have now pretty well covered themselves for the winter, there are still a few contracts in the market. These, however, judging from the firmer tone now assumed by coalowners, it is scarcely probable will be placed on such favourable terms as might have been secured earlier on in the summer, and consumers who have been holding back in anticipation of still lower prices, are now finding it difficult to obtain tenders except at a small advance upon late rates.

The improved demand for round coal, suitable for house fire purposes, is generally maintained, and most of the pits are now working full time, whilst stocks, as a rule, are being kept down. In the Manchester market a small advance in the delivery rate for house coal has been made this month, but the pit prices show no material change. In the South-West Lancashire districts some of the firms have issued notices of an advance of 1s. per ton on round coal, but it is doubtful whether any general advance to this extent can be maintained, as supplies are still tolerably plentiful. The market, however, is very firm, and although advances may not generally be made to old customers, outside buyers will, no doubt, have to pay rather more money this month.

In other classes of fuel there is very little material change. The demand for iron-making and general manufacturing purposes continues dull; but good qualities of burgy and slack are not difficult to sell at late rates.

The shipping trade generally continues quiet, and common qualities of coal for steam purposes are difficult to sell, in consequence of the keen competition of Welsh coal. In coke a rather better trade is now being done.

The iron trade does not show much improvement, so far as the general demand is concerned; but prices, especially in north country brands of pig iron, are firmer. Thin iron, however, is still sufficiently low to undersell the local makes; and Lancashire smelters, who are not at all disposed to lower their quotations, are at present practically out of the market. For Lancashire iron, delivered into the Manchester district, the quotations nominally remain at 56s. to 57s. per ton for No. 3 foundry, and 55s. for No. 4 forge. In finished iron there is no material change, Middlesbrough bars delivered into the Manchester district being still quoted at £6 15s., Lancashire at £6 17s. 6d., and Sheffield and Staffordshire at £7 per ton; but there is a good deal of competition for orders, and it is difficult to say what values really are.

It may be mentioned as a significant fact, that in the competition for the castings required for the fireproof construction of a mill in the neighbourhood of Manchester, tenders have been sent in by no less than three Belgian firms.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The coal trade of the North of England was very brisk last week. The shipments of gas and other coals from Tyne Dock alone would exceed 30,000 chaldrons. The best qualities of gas coals are very firm in the market, and turns have got rather long. A good deal of inferior coal has been shipped to the Continent, as the home demand is only very poor. Steam coals vary very much in price. The very best is held at about 12s. per ton. Moderate and inferior sorts are sold from 11s. to 8s. 6d. per ton. Small coals are very bad to sell, and the collieries seem to be overstocked with them. The small reduction upon pitmen's wages, made by Mr. George Lefevre, seems to be accepted as satisfactory on both sides. The case of the Northumberland coalowners, for a reduction of wages, has been before the umpire and arbitrators, and will be finally settled in Edinburgh by the umpire, Dr. Playfair, M.P., probably in about ten days.

The arrivals of shipping in the Tyne within the past fortnight have been large. All the coasting vessels, however, have been taken up at the advance of 6d. per ton as quoted last week, loaded and sent to sea; and there are still a number of coasting orders in the market with handy sailing tonnage in request. A little more money will have to be paid for ready ships for the east coast and the British Channel. Steamers are very well employed in the London trade at an advance nearly corresponding to sailing ships. Outward coal sales to the Mediterranean are extremely poor; but the corn business from the Black Sea is much better, and steamers are paying. The improved tone in the freight market has the appearance as if it would continue the remainder of the year.

The general manufacturing trade of the Tyne, and North of England generally, is undoubtedly firmer this, the first week in October, than it was in the first week of September. The chemical market shows most improvement, and prices are about 6 per cent. higher than they were a month ago. This seems to have been established, and stocks have been somewhat reduced. There is a moderately fair demand for fire-clay goods, cement, and other miscellaneous articles of commerce of that description. The iron trade seems to have taken an upward turn at last; also there is decidedly a better feeling in the market generally since the rotten houses have been cleared out.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The ninth half-yearly meeting of the West of Scotland Association of Gas Managers, held last Thursday in the Andersonian University, Glasgow, was a great success. Mr. Levi Monk, of Lanark, the new president, occupied the chair, and delivered a very comprehensive and suggestive address. I do not wish to anticipate the official report of the proceedings, which will, in due course, appear in the JOURNAL OF GAS LIGHTING; and all that I would wish to do on this occasion is to indicate in the briefest manner what took place. The president strongly urged the desirability of establishing for Scotland a national standard of illuminating power for gas—say, of 20 candles—instead of having such a wide range as from 18 to 34 candles; and on this subject he elaborated his views more in detail at the evening meeting. He also dwelt at considerable length upon the question of leakage or unaccounted-for gas, and showed that while in some places it had been reduced to 5½, 6½, 7½, 9, and 10 per cent., in other places it was still as high as 18 and 19 per cent. (Dundee and Glasgow, respectively). Mr. William Young, of Clippens, read a most interesting paper on "Condensation: the Treatment of the Products of the Destructive Distillation of Coal after they leave the Retorts." Many of his remarks were illustrated by very striking and interesting experiments. The members of the Association may congratulate themselves on having amongst them a gentleman of such scientific attainments as Mr. Young possesses, in respect of the chemistry and physics of the manufacture, purification, and economical consumption of coal gas. He is imbued with the true spirit of scientific inquiry, and is never disposed to take anything for granted until it has been put to the test of rigid experiment. After Mr. Young's paper was concluded, a general discussion ensued among the members on various topics referred to in the president's address, and upon others suggested by the members themselves—the governing body of the Association having announced, in the circular convening the meeting, that facilities would be afforded for raising questions for the interchange of opinion. A large number of the country members visited Glasgow Cathedral in the afternoon, and subsequently they partook of dinner together in the Caledonian Restaurant—Mr. Monk occupying the chair, and Mr. Samuel Stewart, of the Greenock Corporation Gas-Works, one of the honorary members of the Association, discharging the duties of the vice-chair. In considering the place for holding the next general meeting of the Association, a strong claim was made in favour of Kilmarnock, on account of the fact that Mr. Dalziel, the manager of the gas-works in that town, had been very successful in the establishment for treating the residual products of the gas manufacture, which had hitherto been a considerable difficulty with gas managers generally. Linlithgow was also proposed as the place of meeting, and eventually selected by a majority.

In his report on the Glasgow gas, for the week ending the 23rd of September, Dr. Wallace shows that the highest illuminating power was 28·48 candles (Tradeston), and that the lowest minimum was 25·09 candles (Dawsholm). The Dalmarnock gas showed 18·47 grains of sulphur per 100 cubic feet, and 0·16 grain of ammonia.

At the ordinary monthly meeting of the Campbeltown Town Council, held last Thursday, there was read a correspondence with Messrs. Lindsay, Howe, Tytler, and Co., law agents for the Duke of Argyll, regarding a feu for the gas-works, and the council instructed the clerk to intimate their acceptance of the terms proposed. They further remitted to the provost and bailies to meet with the directors of the gas company, and take the necessary steps for having the property of the company transferred to the corporation.

In various parts of Scotland there are loud complaints against local authorities at their dilatoriness in lighting the street-lamps for the season. There is also a

complaint against what seems to be a very remarkable anomaly—namely, the charging of 9s. 2d. per 1000 cubic feet for the gas supplied to the people of Lesmahagow, which is the very "head centre" in Scotland for rich cannel coal.

A public meeting has recently been held at Burghead, near Elgin, for considering the question of a supply of water, which the Board of Supervision insist should be procured without delay, as the present supply from the wells is both defective and unfit for domestic use. It was agreed to request the local authority to form a special water supply district, and take steps to secure a supply from the Hill of Monaughty, some eight miles distant, the probable cost of the scheme being £3800.

Sandbank, one of the watering-places on the Clyde, is on the move for a water supply scheme of its own, rather than have to depend upon Dunoon.

About twenty offers have been received for carrying out the works of the Crieff drainage scheme, the lowest being £3066, and the highest £5056.

At the meeting of the Sanitary Sub-Committee of the Carluke Police Commission, it was resolved last Tuesday to proceed with a portion of the drainage scheme for that town.

The pig iron warrant market has been much firmer during the past week, as high as £2 17s. 6d. cash being paid last Friday. Some special brands have been advanced 2s. 6d. per ton.

Nothing of any importance falls to be reported regarding the Scotch coal trade.

Taunton Water-Works Company.—At a meeting of the shareholders of this company on Sept. 19, it was resolved by a majority of three-fourths of those present to dispose of the works and undertaking of the company to the Taunton Local Board of Health for the sum of £20,000.

Neath Water Supply.—At their last meeting the Neath Town Council discussed at length a proposal to purchase the local water-works, and a resolution was passed that the water company should be offered £25,000 for the Neath undertaking, or £30,000 for the Neath and Briton Ferry undertakings, or any such sum as a Board of Trade arbitrator might consider reasonable.

Fylde Water-Works Company.—The directors of this company, in their half-yearly report, state that the total expenditure on capital account to Aug. 31 last was £136,935. The revenue account for the past half year shows the receipts for water during that period to have been £6122 1s., which, after deducting interest on loans and working expenses, leaves a balance of £4447 14s. The receipts for water show an increase of £748 over those of the previous half year, and the directors recommend a dividend at the rate of 7½ per cent. per annum on stock A, and 7 per cent. on stock B, each less income-tax. An additional supply of water being required for Lytham and St. Ann's-on-the-Sea, the directors have contracted for a direct line of pipes from the Weeton reservoir to the latter place, which will also be available by extension for giving an increased supply of water to South Shore, Blackpool. Certain sums arising from premiums upon the sale of stock B, &c., the directors recommend should be carried to the reserve-fund, which will be thus increased to £3500. The number of houses supplied with water during the past half year had increased from 5115 to 5557.

Saxon Pumps and Holy Wells.—At a meeting last week of the guardians of the Drogheda Union, in reference to a sanitary recommendation of the medical officers and the engineer, which would necessitate an expenditure of £30, one of the guardians (Mr. M'Kenna) spoke in very strong language against a general disposition at the board for sinking what he termed "Saxon pumps in all their holy wells." He proceeded to say that their venerated wells, blessed by the saints, were places of resort for the people to say their prayers at, but they were fast disappearing, for whenever a complaint was made in a district about want of water, down went a Saxon pump, and the holy well could not be utilized for the purposes of prayer. The chairman sympathized with the speaker, and considered that the pumps were of no use to the poor, and only an expense to the public rates. It would be difficult to find more characteristic evidence of the enlightenment of local sanitary authorities in small rural districts. The chairman's impatience at "complaint about want of water" fitted him well to sympathize with the horror of Saxon pumps and the preference for polluted surface wells, but it is rather hard that the administration of the Public Health Acts should be lodged in such hands.—*British Medical Journal.*

Stourbridge Gas Supply.—A meeting convened by handbill, for the purpose of promoting an agitation against the Stourbridge Gas Company, was held at the Corn Exchange on the 25th ult.—Mr. John Pearson in the chair. The meeting could hardly be called a success, as, according to the local reports, there was but a sprinkling of persons present, and the chairman evidently did not know why even they had been called together. A Mr. Prescott, who volunteered the statement that he had hired the room, and would turn out any one who differed with him, moved a resolution that, in the opinion of the meeting, the directors of the Stourbridge Gas Company should reduce the price of gas to consumers of 30,000 feet and under to 2s. 9d. per 1000; from 30,000 to 50,000 to 2s. 6d.; from 60,000 to 100,000, 2s. 3d.; and over 100,000 feet, 2s. Mr. J. Rouud seconded the resolution, and it was put and carried. Mr. Prescott next moved that it was desirable to erect a new gas-work for the township of Stourbridge, in the event of the Stourbridge Gas Company refusing within a month to reduce their price according to the preceding resolution, in order that the ratepayers might have the benefit of the profits arising from the sale of gas and its products, towards the reduction of the town rates. Mr. Job Mills seconded this motion, which was carried. The meeting became very noisy at times, and there was mewing and barking, and various remarks provoking laughter at the back of the room.

Gas Explosions.—On Thursday, Sept. 21, an explosion of gas, which was attended by rather serious results, took place at Fairfax House, Sydenham Road, Bristol. The premises are occupied by Lieut. Baldwin, who sublets them to different persons. On Thursday there was a sale by auction at the house, and it is supposed that in the course of the day some of the gas-fittings in the breakfast-room were disarranged. The escape of gas was noticed, and a man incautiously entered the apartment with a light. The gas immediately exploded, and the man was knocked down, but fortunately escaped uninjured. The flame from the ignited gas extended to an upper room, and there set fire to some bed-clothing. Several men happened to be on the premises at the time, and they procured buckets of water, and with the assistance of the force-pumps of the fire brigade succeeded in extinguishing the conflagration, but not until property of the value of £80 had been destroyed.—Last Wednesday an explosion occurred at the residence of Dr. Leared, 12, Old Burlington Street, London, resulting in dreadful injuries to a man named Alfred Otteridge, a resident of Bath. It appears that during the absence of Dr. Leared and family, the mansion has been undergoing repair and redecoration. The footman informed Otteridge that the dining-room smelt of gas, and cautioned him not to enter the room with a light. A short time elapsed when he heard a loud explosion and was hurled to the ground. On entering the dining-room the furniture was scattered about in all directions, and the glass roof of the conservatory was demolished. In one corner of the room Otteridge was discovered writhing in agony, and his clothing was burnt and torn from his body. He was forthwith removed to St. Thomas's Hospital, where his injuries were found to be severe. The explosion was caused by Otteridge holding a lighted candle near the chandelier.

Bursting of a Reservoir.—On Monday, Sept. 25, a serious accident happened at Tow Law by the bursting of a reservoir, belonging to the Shildon and Weardale Water Company. The reservoir is constructed of malleable iron and cast-iron plates, is cylindrical in shape, and contained about one million gallons of water. The bottom of the reservoir is made of puddled clay, which rests upon a very insecure foundation, as the coal, which was only a few feet below the surface, has recently been worked out. The iron plates which form the cylinder are 10 feet in height, and above the surface; and to strengthen them an embankment has been raised around the outside. On the morning in question a leakage was reported to Mr. John Emerson, the Tow Law agent for the water company, who hurried to the spot. He found the water gushing up from between the plates and the outside embankment, and the place surrounded by children. Scarcely were they driven from their dangerous position when the embankment upon which they had been standing was "hushed" away, and the water, with irresistible force tearing away the cast-metal plates, made a breach through which a horse and cart may now be driven. The immense volume of water rushed down the field in which the reservoir is situated, and then over the cutting of the Stockton and Darlington Railway, along which it flowed like a river. The embankment on both sides of the railway confined the outburst until its arrival at the railway crossing leading to the Tow Law Iron-Works. At this point, Mr. J. Bond, jun., engineer to the Weardale Iron and Coal Company, has his residence, and a part of the flood which the narrow road could not contain found a passage in at the back and through the front door, doing much damage. The torrent continued its headlong course towards the iron-works, where it found a resting-place in a large pond, which fortunately was nearly empty.—*Newcastle Daily Post.*

The Proposed Purchase of the Lichfield Gas-Works.—At the meeting of the Lichfield Town Council, on Sept. 23, the Gas Committee reported that they had met the directors of the company, and submitted to them offers to purchase the works for annuities or permanent debentures, instead of for cash; but that the price asked by the directors was such as they could not accept. They recommended that inquiries should be made as to what per centage would have to be paid if they borrowed £20,000 for twenty years, to enable them to pay in cash. Some little discussion followed, in the course of which the town-clerk pointed out that in the case of Warrington, the Local Government Board had held that they could not issue a Provisional Order to enable the corporation to purchase gas-works which supplied other places than the district under the control of the corporation. He further stated that if that was the decision of the Local Government Board, Lichfield could not obtain a Provisional Order, but must go for an Act of Parliament, as the gas would have to be supplied outside the city. The adjourned meeting was held on Thursday last, when the town-clerk explained the difficulties in the way of giving notices in November, and applying for an Act at least in the next session; and it was therefore agreed that an Act should not be applied for, but the purchase of the gas-works should be carried out on the original terms. Alderman Hodson pointed out that the agreement for purchase was no longer in force, and stated that the company required that it should be at once carried out, or a new one entered into. The new one was prepared, and contained a clause that the corporation should get "the necessary statutory powers" to purchase the gas-works; but to this the council objected, on the ground that it would compel them to do what they had just declined—namely, obtain an Act of Parliament. Ultimately, however, it was agreed that the new agreement should be referred to the town-clerk for settlement, the council undertaking once more to apply for a Provisional Order, the gas company to keep the works in repair until the transfer.

Gas and Water at the Philadelphia Exhibition.—The correspondent of *Engineering* states that, at the Centennial International Exhibition gas is supplied for police purposes only. The pipes are arranged in seven longitudinal lines in the main building, and in four lines in the annexe. A 4-inch main is laid through the centre lengthwise, from which pipes are taken at regular intervals across the building, and from these, vertical pipes up at the columns are extended by branches laid horizontally at the level of the tie-beams of the low roofs, to form the seven longitudinal lines in the main portion of the building, and the four lines in the annexe. Burners are placed in these pipes about 2 feet apart, there being a stop to each main branch, and, in addition, all necessary lights are provided in offices, restaurants, at entrances, &c., by special service-pipe, the total number of lights supplied being 5000. The number of feet of gas-pipe used is as follows:—

1260	feet lineal	4 inch pipe.
730	,,	2½ ,,
2270	,,	2 ,,
935	,,	1¼ ,,
8700	,,	1¼ ,,
350	,,	1 ,,
720	,,	¾ ,,
580	,,	¾ ,,
650	,,	½ ,,

36 2-inch gas stopcocks.

The gas is passed into the building through two meters. The water service system consists of three main lines with the necessary branches of cast-iron ball and socket pipes, 8-inch, 6-inch, and 4-inch internal diameter, provided with all necessary curves, bends, branches, tees, hydrant bends, hydrants, stop-valves, &c. The pipes are in 12-feet lengths, tested to 300 lbs. per square inch inside pressure, the 4-inch weighing 216 lbs. per 12-feet length, the 6-inch 360 lbs., and the 8-inch 500 lbs. The amount of cast-iron pipe used is as follows:—

1691	feet lineal.	8-inch pipe.	
5424	,,	6 ,,	
2772	,,	4 ,,	
90	,,	6 ,,	special castings.
20	,,	8 ,, ,,	,,
624	,,	10 ,,	cast injection-pipe.

The latter item is a special pipe running from the bottom of the lake north of the machinery hall, to supply the boilers for the 1402-horse power Corliss engine that occupies the centre of the building.

Register of New Patents.

3221.—Crossley, F. W. and W. J., Manchester, "*Improvements in gas motor engines.*" Patent dated Sept. 15, 1875.

This invention consists in improvements on gas motor engines of the kind described in Patents No. 434 of 1866, No. 2245 of 1867, Nos. 605 and 3205 of 1874, and relates to the provision of an air spring or cushion to check the piston at the top stroke and force it backwards; to means of moving the piston for drawing the combustible charge into the cylinder; and to a mode of applying the governor to such engines. The air-spring is provided by making on the piston a boss or annular projection, which, as the piston approaches the top of its stroke, fills a hole or cavity in the cylinder-cover. The piston is moved for drawing in the charges by a roller, on the strap of the eccentric that works the valve, acting against a stop on the toothed wheel friction-box, which gears with the piston-rod; and the governor is fitted on the main shaft, so that when its balls expand in opposition to a spring, they move a bell-crank lever, which prevents the valve eccentric from engaging with the revolving shaft, and thus stops the supply of a charge to the cylinder.

3247.—Fleury, F. G., Bristol, "*Improvements in water-meters or apparatus for measuring the flow of liquids or fluids.*" Patent dated Sept. 17, 1875.

This invention relates to that class of meters in which a spindle is caused to rotate by the action of the fluid or liquid against flies or vanes fixed thereon for driving recording mechanism to indicate the quantity of water passed, and consists in constructing meters in such a manner as to produce a differential vortex motion of the liquid or fluid, thereby causing a reliable action of the

flies or vanes on the recording mechanism. For this purpose within the body of the meter there is an inverted chamber of conical, parabolic, elliptic, or other analogous form, having tangential inlet openings in the upper portion or top, and in the bottom openings are made exactly in the opposite direction. The lower and smaller portion of this chamber is provided with an adjustable footstep on which the spindle rotates, and passing up through a circular box in the top of the chamber (into the registering mechanism) drives, by means of a worm on the spindle, a train of wheels for recording the flow of liquid. Within the chamber are arranged two or more flies attached to the spindle, the outward edge of which corresponds to the shape of the chamber, and on the bottom of the circular box for the registering mechanism is formed, by a slot or its equivalent, a driver for raising or depressing a brake formed of a ring, disc, or bar, screwed externally, and fitting into a corresponding thread in the upper portion of the conical chamber. By this means the brake is raised or lowered, thus effecting an easy and certain method of adjusting the meter.

3250.—EWER, E. DE, and BLOOMFIELD, H., Maidenhead, "*Improvements in the means or apparatus employed for generating and supplying lighting gas produced from hydrocarbon oils.*" Provisional protection only obtained. Dated Sept. 17, 1875.

In these improvements the gas generator consists of two or more shallow vessels, partially filled with petroleum or other hydrocarbon, with perforations or minute apertures, whereby the air is caused to pass gradually and completely over the spirit, and become thoroughly saturated with the volatile hydrocarbons. Below these vessels there is provided a subsidiary holder in communication by pipes with them in such manner that the gas issuing from the shallow vessels passes thereinto. The magazine for store of spirit is placed above the shallow vessels, from which by a bird fountain action arrangement the level and more uniform density of the spirit in the generator is maintained. A tank surrounding the subsidiary holder can be utilized for overflow as well as for additional storeage space. The subsidiary holder, being weighted to less pressure than either the air-holder or the propelling pressure of the drum, stands at full while the air-holder is at pressure, and when the air-holder is exhausted, or the balance run down, the subsidiary holder sustains the lights while the air-holder is refilling or the balance rewound; and should the air-holder not be refilled or the weight drawn up before the subsidiary holder is run out, the cap in the subsidiary holder comes over the outlet and shuts off communication.

3258.—JUDKINS, C., Fleet Street, London, "*Improvements in apparatus for regulating the supply of gas to gas-burners.*" Patent dated Sept. 17, 1875.

This invention relates to apparatus to be placed between a meter or main and the burner or burners, for the purpose of regulating the supply of gas. The apparatus consists of a box or vessel of any suitable form, in which is fitted a valve. Above this valve is a diaphragm, to which it is connected, or by which it is operated. This diaphragm is of metal, and has flanges that extend downward, and dip into a trough containing mercury, thus allowing it to work freely in the box while making a secure and perfectly tight joint, which prevents the escape of any gas. The diaphragm may be provided with adjustable or variable weights, or with a spring for regulating its pressure on the valve. The inlet passage for the gas enters the vessel below the valve, and the chamber or space between the valve and diaphragm communicates with the outlet passage.

In another form of the apparatus for the metallic diaphragm and trough containing mercury there is substituted a diaphragm of leather, india-rubber, or other suitable flexible materia', secured tightly to a flange on the inside of the vessel by screws or otherwise.

It is very important that the case or box of the apparatus should be so constructed as to exclude foreign substances, such as dust and the like, while free communication is maintained above the diaphragm with the external atmosphere. For this purpose, when the apparatus is to be used in railway carriages and in other exposed situations, the case is provided with a cover of metal or other material, which is fitted and secured above the diaphragm; and communication with the external air is provided for by perforating the sides of the box with small holes; or a cover partly formed of finely perforated metal or wire gauze may be used. This cover is secured on the box by screws or otherwise, in such a manner that it may be readily removed, to permit access to the interior of the apparatus.

According to another part of the invention, single burners, such as street lamps, are provided with regulators. For this purpose there is combined with the burner a box or chamber, of sufficient size to contain the valve and diaphragm. This is preferably constructed in two parts, secured together by screwing one into the other, by means of small screws passed through flanges, or in any other suitable manner. It is provided at the bottom with a screw socket for attachment to the gas inlet-pipe, and at the top with an internal screw for the reception of the burner. The diaphragm is made of leather, india-rubber, or other suitable material. It is placed above the valve, and secured between the two parts of the chamber. The valve is fitted to a seat in the inlet passage, and is attached to the diaphragm by a small screw-rod, or by other means which permit it to be readily and accurately adjusted.

3260.—SOLEY, G. T., Liverpool, "*An improved self-sealing cover or lid for gas and other retorts, &c.*" A communication. Patent dated Sept. 17, 1875.

In carrying out this invention there is formed around the opening to be closed a true face to make a seat for the cover, or lid, which has its face flat and true, and as smooth as possible, so that when fitted and held snugly against the seat an air-tight joint exists between them. A screw passing through a cotter-bar, or other suitable support, has its inner end attached in any suitable manner to an eccentric head or cam of any required dimension, which head or cam is seated in a recess in the cover or lid, so that upon turning the screw inward, it forces the cover or lid directly against the seat, while at the same time, by means of the eccentric head, it slides, or shifts, the cover or lid about over the face of the seat.

3267.—TURNER, S., J., and R., Rochdale, "*Improved means for securing the joints of steam and water-pipes, and for other similar purposes.*" Patent dated Sept. 18, 1875.

This invention consists principally in combining with flat india-rubber or other elastic rings or washers, strengthening rings of metal of a tough-like section, applied (by preference) to their outside circumference, but the metal rings may, if thought desirable, be applied to their inner circumference or edge, or even to both edges.

3287.—ROWE, J. N., Rockland, Maine, U.S.A., "*Improvements in pumps.*" Patent dated Sept. 20, 1875.

A pump constructed according to this invention consists of a box or casting from which leads the suction pipe or pipes, the top of the box being formed by preference of two inclined planes having on their surface the suction-valves of the pump. Bolted, or otherwise attached to this box is a cylindrical box which forms the pump proper, and is set on the foot or suction box with its axis in a horizontal position. The lower half of the pump proper is divided into two chambers by a diaphragm, which extends from the centre of the pump to the apex of the inclined sides of the foot box. Within the pump there is an oscillating or rocking plate, which has its axis coinciding with the centre of the pump, and is held in position and is oscillated by a shaft, or "king bolt," which has its bearings on each side of the pump, and is worked by suitable levers or handles. The oscillating or rocking plate is provided on each side with a valve communicating with the suction chamber of the pump, and acting as delivery or discharge valves to the pump. The plate is also fitted with a suitable leather or packing ring between the plate and the sides and ends of the pump. The upper part of the pump is provided with a delivery or discharge outlet, which, when the pump is required for lift purposes only, is left open, but when required as a force-pump or fire-engine it is closed. The pump becomes a force-pump or fire-engine by the addition of a plate or flange, which cuts off the upper portion, and constitutes an air vessel of it. There is also a diaphragm, dividing the portion of the pump between the rocking plate and the upper plate or flange into two chambers. The upper plate is provided with two delivery valves opening from the chambers into the top of the pump, being the air vessel. The upper portion of the pump is provided with a suitable nozzel or flange, to which a discharge-pipe, may be attached.

3299.—KIDD, J., Dartmouth Street, Westminster, "*Improvements in vapour gas generators and burners.*" Provisional protection only obtained. Dated Sept. 21, 1875.

The chief novelty of this invention consists in forming an apparatus for generating vapour of a series of trays, placed one above another, light petroleum spirit being supplied to the top tray by an arrangement similar to the oil-feeding cups used for lubricating purposes. The vapour generated, being heavier than air, falls, and draws with it air, which is conveyed through suitable pipes to burners. Combined with this vapour generator is an Argand burner, made with a large gas outlet and a small air inlet. The draught of the glass chimney used with the burner is thus made to draw or suck the vapour gas from the pipes, and by this means a large number of lights may be supplied from one generator.

3301.—WESTON, F., Clapham, Surrey, "*Improvements in apparatus connected with increasing the illuminating power of coal gas.*" Patent dated Sept. 21, 1875.

The object of this invention is to carburet coal gas, by causing it to come into contact with and absorb hydrocarbon fluids or liquids, and for this result a chamber is employed, provided with a series of columns of sponge, or other fibrous matter, which take up or absorb and hold in suspension the liquid given off in vapour by the gas in its passage through the chamber from the inlet-pipe to the outlet, which are placed at opposite sides. The bottom of the chamber, to a required depth, is supplied and replenished with liquid from an upper chamber, or reservoir, to the level required to be maintained in the bottom, or carburetting chamber. For this purpose—viz., to secure the constant level, and prevent the liquid from overflowing, and flooding the carburetting chamber—an air chamber is so fixed that when the liquid has arrived at its required level it seals the air chamber, and creates a pressure sufficient to prevent a further supply from above, and thus maintains its level until the whole of the liquid in the reservoir has been exhausted.

An important part of these improvements relates to the means for supplying or replenishing the reservoir with the necessary liquid. For this purpose a cock is employed, which opens and shuts by means of a key or lever, one end of which passes over the top of a funnel or cylinder attached to the cock, and indexes when it is either on or off. This cock is so arranged that when it is turned on for filling, by one simple action the whole of the apparatus is controlled—viz., as it is turned on for the purpose of replenishing the reservoir it immediately closes the supply to the bottom chamber, so as to prevent its flooding while the top is open; and, at the same time, it opens an air vent, by which means the air in the chamber escapes so as to allow the liquid to take its place; and, again, by the same simple action of turning off, the apparatus is in working order, and perfectly anti-pneumatic. A float is adjusted so as to indicate if the liquid is at its proper level in the carburetting chamber, or whether it requires replenishing.

3303.—BELL, A. P., Manchester, and THORP, T., Whitefield, near Manchester, "*A new and improved apparatus for lighting gas automatically.*" Patent dated Sept. 21, 1875.

This apparatus consists of a receptacle made of pot or other hard substance, with sunk chambers communicating with each other, for holding mercury and glycerine or other liquid. To this receptacle is screwed, or otherwise fastened, a pipe, which is supplied with gas from the main. A cap fits in the receptacle with two pipe-mouthed valves; one for opening and closing at any particular pressure of the gas, and allowing it to escape through a pipe fastened in the cap to the burner; the other valve allowing, for a short time, a portion of gas coming from the first valve to escape, and be ignited by a small jet constantly burning. The upper part of the cap has a projecting rim for preventing direct draught of air to the small jet. A cover is placed over the whole apparatus, the lower and upper sides being perforated for inlet and exit of air, the whole being locked or otherwise secured to the apparatus.

3316.—BARTRUM, W. E., Streatham, Surrey, "*Improvements in rotary engines, pumps, or meters.*" Patent dated Sept. 22, 1875.

This invention relates to rotary apparatus applicable as an engine, pump, or fluid-meter, and consists of an eccentric or crank on a shaft mounted in the axis of a cylinder, having a strap in contact with the interior of the cylinder, from which a slab-arm projects through turning bushes, through which it can slide. Steam or fluid under pressure, admitted by a port at one side of these bushes (an escape port being provided at the other), causes the shaft to rotate, or if the shaft be rotated by power, fluid will be drawn in at the one port, and forced out at the other.

3334.—SUGG, W. T., Vincent Street, Westminster, "*An improved apparatus for indicating the illuminating power of gas.*" Patent dated Sept. 24, 1875.

This invention is based upon the fact that, to maintain a flame of a certain height, a quantity of gas proportionate to its quality will be consumed in a given time, and consists of a meter to which gas is admitted, and the drum made to revolve, the gas passing from it through two governors fixed to the meter. The first governor regulates the pressure, and the second one corrects any irregularities the first one may have failed to meet. The gas from the governors flows to an Argand burner by way of a standard fixed to the top of the meter, and fitted with a cock, handle, and pointer, and quadrant or divided arc. The standard has also attached to it a frame carrying a horizontal wire and coloured glass plate, to and by which the flame from the burner is adjusted. The pipe connecting the supply-pipe, meter, and governors together, has inserted in it, at a suitable point, a bye-pass or three-way cock, so that the gas may pass directly to the governors and thence to the burner, or it may proceed first through the meter before reaching the governors. To test the illuminating power, the gas is first admitted from the supply-pipe through the governors to the burner, where the gas is lighted, and the flame adjusted to the height of three inches. The bye-pass is then turned so as to permit the gas to flow through the meter, when by observations of one minute the quantity of gas consumed and the illuminating power in parliamentary sperm candles will be indicated by the pointer on the dial, which is suitably marked for that purpose.

[This invention was described and illustrated in the JOURNAL for April 25 last, vol. xxvii. p. 618.]

3394.—PHILLIPS, W. H., Nunhead, Surrey, "*Improvements in taps and valves, and in apparatus connected therewith.*" Provisional protection only obtained. Dated Sept. 29, 1875.

This invention relates more especially to improvements in what are known as ball-cocks, taps, or valves; one of the chief features being the substitution of an inverted cup or basin to serve as a float for cutting off the supply of water or other fluid flowing through a pipe, in place of the ordinary copper ball float in general use.

3398.—WALKER, W. T., Highgate, Middlesex, "*An improved gas-testing cock.*" A communication. Patent dated Sept. 30, 1875.

This invention consists in the construction of an improved gas-testing cock for use in gas-works for ascertaining the temperature of the gas and for detecting its impurities at any part of the works, and in the principal mains or apparatus, in a more perfect and simple manner than hitherto, and without escape of gas.

Gas-testing cocks as hitherto employed have been constructed of a pocket or envelope formed with a flange or rim and screw thread at one end, by which it is screwed into a corresponding hole in the principal main. Into this pocket or envelope was placed a thermometer fitted to a conical plug and handle, but as no means were provided to allow of the gas coming into contact with the thermometer, the temperature of the gas could not be correctly ascertained, and this construction of cock did not admit of testing the quality or degree of purity of the gas.

According to this invention the gas-testing cock is constructed as hitherto of an outer envelope or pocket, consisting of a tube of iron, brass, or other metal or alloy closed at one end and open at the other, and formed with a flange or rim and a screw thread, but the pocket is made of a conical shape, and two apertures of suitable dimensions are formed therein. These apertures, which are directly opposite each other, serve for the admission of the gas into the cock. In the outer envelope there is fitted, so as to work gas-tight, an inner moveable envelope or slide of iron, brass, or other suitable metal or alloy, having apertures corresponding with those in the outer envelope or pocket. One end of the slide or plug is open for the introduction of the tester (hereafter described), and the other end may be open or closed. At the lower end is a hitch or stop, working in a transverse slot in the outer envelope or pocket, which allows of the slide or plug being turned, so as to open or close the apertures in the outer envelope or pocket. This slide or plug has for object to admit or shut off the gas.

The tester consists of an ordinary thermometer fixed to a conical plug and handle as usual, so that when the tester is introduced the conical plug shuts it gas-tight. On the side or other suitable part of the thermometer a metal spring is fixed for receiving and holding a piece of test-paper or other testing material, and the tester is made secure by means of a hitch or stop in the conical plug working in a bayonet joint slot.

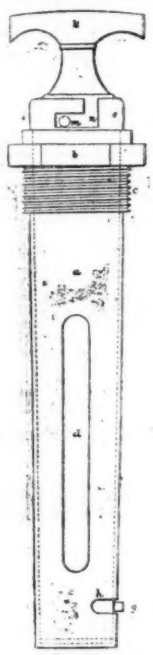

FIG. 1.

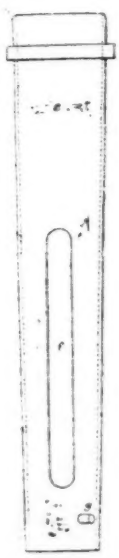

FIG. 2.

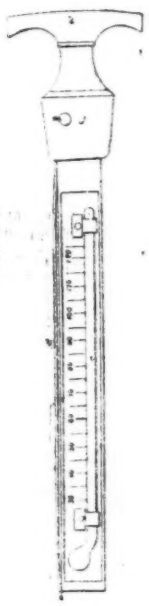

FIG. 3.

Fig. 1 is a front elevation drawn half size, the cock being shown closed; fig. 2 is a detached view of the slide or plug; and fig 3 is a detached view of the tester; *a* is the outer envelope or pocket formed of a conical shape, and closed at the lower end; *b* is the flange or rim, and *c* the screw thread of the same; *d* is one of the apertures of the pocket for the admission of the gas, and *e* is the inner envelope or plug formed with apertures *f*, corresponding with the apertures in the pocket *a*; *g* is the hitch or stop of the slide working in the transverse slot *h* in the pocket; *i* is the thermometer of the tester shown in fig. 3; *j* is the conical plug, to which the thermometer is fixed, such plug fitting gas-tight in the slide *e*; *k* is the handle, and *l* is the spring fixed to the side (or other suitable part) of the thermometer; *m* is the hitch or stop in the plug *j*, and *n* is the bayonet joint slot in the upper end of the slide or plug *e*.

To use this improved testing-cock, a hole (corresponding in size with the tapped part of the outer envelope) is bored in the principal main, and tapped as heretofore, and into this hole the outer envelope *a* of the cock is screwed tight up against the flange or rim *b*, the inner envelope or plug *e* being in the position necessary to close the apertures *d* in the outer envelope *a*, as shown in fig. 1. If the tester shown on fig. 3 be now introduced into the cock, and placed in the position shown in fig. 1, it will be understood that by turning the same to the right by means of its handle *k*, the slide or plug *e* will be turned, and the apertures *d* and *f* of the two envelopes *a* and *e* respectively will be brought opposite one another, and the cock will be opened. The gas passing through the main will thus be allowed to pass through the cock, and will come in contact with the thermometer and the testing-paper or other testing material. If the handle *k* be now turned to the left, the apertures of the envelopes *a* and *e* will be closed, and the tester can be withdrawn without escape of gas. The degree on the thermometer can then be read off, and the colour of the testing-paper or other testing material be examined.

3440.—JEWITT, H., Kentish Town, Middlesex, "*Improvements in Argand gas-burners.*" A communication. Patent dated Oct. 4, 1875.

Heretofore this class of burners has been made in several parts of cast or sheet metal, or both combined, each part being turned, bored, stamped, or pressed into the desired form, and then the whole secured together by lapping, pressing, soldering, or otherwise.

These improvements consist—

1. In a burner made by depositing on a metallic mould (the surface of which corresponds with the interior of the body of the burner) by means of an electric current, a suitable covering of copper or other metal of the desired thickness to form the body or shell; then drilling through the copper and into the mould, the apertures for the escape of gas, and thereafter melting out the mould, leaving the outer metallic shell complete.

2. In a device for governing the flow of gas, consisting of a valve operated by an eccentric lever, which rests upon the top of the pillar in such a manner that by being lifted or depressed it closes and opens the valve, and is so arranged that it may be adjusted horizontally to any desired position for convenience of operation.

3. In a modification of the device for governing the flow of gas by means of a lever attached to a cut or slotted pin working in a perforated or slotted tube secured at the lower end in a bushing attached to the lower end of the "pillar" of an Argand burner, and the upper end to the top of the pillar, all so arranged that when the lever is moved to turn the pin, the slot, or hole in the vertical tube will be covered, or partially so, by the solid portion of the pin, and so close or regulate the flow of gas.

4. In a further modification of the governing device, which consists of a plate attached by a pivot to the top of the bushing described under the third head, the plate being capable of revolving, or partially so, upon the attaching pivot. In the head of the bushing are perforations, and on the under side of the plate are indentations. When the indentations correspond to, or are over the perforations, the flow of gas is at its full, but on the plate being moved around by means of a lever or catch, the solid part of the plate will cover, or partially so, the perforations, and thus cut off or regulate the flow.

5. In an arrangement of wire holders for the chimney and globe, consisting of a loop of wire passed through cuts or slots in the rim of the burner, and then turned up to form hooks or a gallery for the globe, the chimney being held by the wire loops.

3446.—CROHN, F. W., Greenwich, and OKES, J. C. R., Maida Vale, London, "*Improvements in combined engines and pumps.*" Provisional protection only obtained. Dated Oct. 4, 1875.

According to this invention a steam-engine is combined with a double-barrelled pump, in which the buckets working in the two barrels travel together simultaneously, and in which the water is drawn in at the end of one pump-barrel, and expelled from the same end of the other barrel, the opposite ends of the pump-barrels being in communication with one another, so that the water may always flow continuously in the same direction through both pump-barrels, both on the in and out stroke of the pump-rods.

3477.—ARROWSMITH, J. J., and FERGUSON, H., Liverpool, "*Improvements in plugs or stoppers for tubes.*" Patent dated Oct. 7, 1875.

This improved stopper consists of a bolt with a shoulder formed at each end. On this two discs or washers, nearly the size of the intended tube, are threaded, and are so shaped that when pressed close together there is an annular V groove between them, in which is inserted an india-rubber ring with bevelled faces. The apparatus is pushed into the tube till one of the rings passes the leak, when the pressure of the steam or water against the inner one causes the india-rubber ring to expand, and thus stops the leak.

3490.—LAKIN, J. P., Birmingham, "*An improved dry slide for gas-fittings.*" Patent dated Oct. 8, 1875.

In these improvements a tube, which forms the outside of the gas-fitting, is bored to the required size in any suitable manner, and to the top end of the usual inner tube a metallic piston is secured, and on it is fitted one, two, or more independent bevelled-edged rings, similar for the most part to metallic pistons as used in steam-engines.

[This invention was described on page 90 of the present volume of the JOURNAL.]

3526.—CLARK, A. M., Chancery Lane, London, "*Improved automatic gas lighting and extinguishing apparatus.*" A communication. Patent dated Oct. 11, 1875.

This apparatus consists in a metal case screwed on to the lamp-post, and having a passage for the gas to pass along one side of the case to the burner. In this passage is a stop-valve to shut off the gas and extinguish the light, when it is let fall by a cam, turned for the purpose by clockwork contained in a chamber within the case. The cam is connected to a shaft of the clock gear by its hollow journal, which extends from the gas passage through a stuffing-box into the chamber. The stop-valve has a spring above it for pressing it firmly on its seat when the cam lets it fall, and above the spring is an opening through the top of the case for introducing the valve and the spring.

The train is turned by strong clock-springs mounted on a shaft secured on the outside of a frame by caps, so that it can be put on and off without taking the train apart. The shaft has an extension along a tubular case, with a toothed wheel, and a pawl and ratchet for winding up the springs by a toothed bar. The wheel turns the cam back to set at the same time that it winds up the springs. The extent to which it is turned back determines the time the clock will run before extinguishing the light; and the extent to which it is turned back is governed by an adjustable collar on the toothed bar, which strikes against the lower end of the guide-tube, and arrests the movement of the wheel. The collar is adjustable along the part of the bar having a scale graduated to the springs and the train, so that the cam may be set for dropping the valve at any predetermined time by shifting the collar to the mark on the scale corresponding to the time wanted. The wheel, being connected to the shaft by the ratchet wheel and pawl, allows the setting-bar to be withdrawn after starting the clockwork. The usual ratchet mechanism is employed in connexion with the clock-springs and shaft, to allow the springs to be wound without turning the clock-train.

In order to start the train when wound up, in case it does not start by the springs, a lever is arranged on a rock shaft or spindle with a pin to push the balance-wheel a little, the lever being swung to throw the pin against the wheel by the incline, on the starting-bar running under and raising the arm of the rock-shaft, when the bar is pulled back after winding up the springs. A spring throws the lever forward again out of the way of the balance-wheel.

For stopping the clock mechanism after the light is extinguished, sufficient friction is created by a lever being pressed, at its free end, against the axle of the escapement wheel by means of a stud in a toothed wheel. This lever is pivoted to the frame of the clock mechanism, and held in place for the stud to strike it.

The guide-tube for the starting-bar is inclined towards the burner, and the bar is provided with fingers at the upper end to carry a match, at the same time that it is used to wind up the clockwork, and strike it against the plate, and then present the burner to ignite the gas, thus allowing the winding and setting of the clockwork and the lighting of the gas all to be accomplished by one operation. The stop-valve is opened by the cam when it is turned back.

3542.—NEWTON, H. R., Portman Square, London, "*A locking apparatus for regulating a constant measured small or large supply of filtered or unfiltered water, to be delivered into existing cisterns or other reservoirs, or by a new system into closed tanks.*" Patent dated Oct. 12, 1875.

This invention consists of an arrangement having two separate and distinct uses—1. Regulating apparatus, including regulators, compressed filters, loose filter, strainer, and sediment tubes or receptacles. 2. Locking apparatus for securing any regulating apparatus from being tampered with. This is constructed out of any screw unions of any size and length, but with the addition of enlarged flanges to side-impinging faces of union for perforation, and to pass the shank of padlocks or other fastenings through. It is also constructed out of any ordinary right and left hand screw unions, but with the addition of enlarged flanges to side-impinging faces, the male-screwing portion being made moveable so

as to make the contact of side-impinging faces simultaneous. The whole arrangement, when combined, is for establishing a continuous refiltering, measuring, circulating, and overflowing water supply system for application to all existing systems and fittings, and for locking up each regulating apparatus (after being adjusted to the special required action) for preventing any alteration of adjustment. The combination is carried out by means of locking flanged or unflanged brass, or galvanized iron, or other metal boxes or barrels, with screw or soldered connexions externally and internally to the supplying pipes. The boxes or barrels are made of any shape, variable in sizes and lengths according to the required quantity of water to be dealt with, and the size of the apparatus to be enclosed. The apparatus may be inserted at any point in the supplying pipes between the service-pipes and the house, or elsewhere as may be desired.

APPLICATIONS FOR LETTERS PATENT.

3745.—COLLET, H., and DENANS, J. B., Paris, "Improvements in apparatus for distributing, purifying, and regulating the flow of liquids." Sept. 25, 1876.

3756.—WIRTH, F., Frankfort-on-the-Maine, Germany, "An improved method of treating spent materials from gas-works by the recovery of sulphur." A communication. Sept. 26, 1876.

3763.—BLUNDELL, G. T. and J. W., Limehouse, and HOLMES, F., Victoria Park, London, "Improvements in pumps." (Complete specification.) Sept. 27, 1876.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

1302.—CARPENTER, W. T., West Minster, Kent, "Improvements in apparatus used in the manufacture of gas." March 27, 1876.

1520.—WIRTH, F., Frankfort-on-the-Maine, Germany, "Improvements in gas-engines." A communication. April 10, 1876.

1615.—MORRIS, W., Deptford, Kent, "Improvements in apparatus or means for establishing a communication with pipes or vessels containing fluid under pressure." April 18, 1876.

1649.—CLARK, A. M., Chancery Lane, London, "Improvements in gas-retorts, and apparatus used therewith." A communication. April 20, 1876.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

2648.—MULLER, J. A., "Improvements in apparatus for measuring and registering the flow of water and other liquids, part of which improvements is applicable to measuring and registering the flow of gases." Sept. 8, 1869.

2685.—NEWTON, W. E., "An improvement in pumps." Sept. 14, 1869.

Share List of Metropolitan Gas and Water Companies.

(Corrected by Mr. F. N. GOLDING, Sun Court, Cornhill, from the latest Stock Exchange Quotations.)

Number of Shares issued.	Amount per Share.	GAS COMPANIES.	Amount paid up per Share.	Last Divd. p.Cent. p. Ann.	Latest Quotations.
	£		£ s. d	£ s. d	£
10000	20	Anglo-Romano . .	20 0 0	10 0 0	16—18
5000	20	Bahia (Limited). .	20 0 0	..	10—11
1000	20	Do., do., redeem.	20 0 0	..	23—25
1500	20	Do., 2nd pref. . .	20 0 0	7 10 0	19—21
40000	5	Bombay (Limited).	5 0 0	7 10 0	6⅞—7¼
10000	5	Do., fourth issue.	4 0 0	7 0 0	1-1½ pm.
10000	20	British (Limited) .	20 0 0	10 0 0	38-40 xd
7500	20	Cagliari (Limited).	20 0 0	5 0 0	..
550000*l.*	Sk.	*Commercial* . . .	100 0 0	10 0 0	215—220
70000	100	Do., 7 per cent. .	..	..	..
20000	20	Continental Union.	20 0 0	6 0 0	23—24
10000	20	Do., new	12 10 0	6 0 0	2-2½ pm.
10000	20	Do., preference .	20 0 0	7 0 0	25—27
5000	10	*Crystal Palace District*	10 0 0	10 0 0	20-20½ xd
5000	10	Do., preference .	10 0 0	6 0 0	13¼-14½ xd
10000	7	Do., ordinary . .	10 0 0	7 0 0	14¼-14¾ xd
2500	10	Do., converted .	10 0 0	10 0 0	..
2500	10	Do., converted .	10 0 0	7 0 0	..
3797280*l.*	Sk.	*Gaslight & Coke* A.	100 0 0	10 0 0	213—217
1000000*l.*	,,	Do. B.	100 0 0	4 0 0	80—85
681070*l.*	,,	Do. 5 per ct. pref. conv., 1st issue.	100 0 0	5 0 0	202—204
591070*l.*	,,	Do. do., 2nd do. .	100 0 0	5 0 0	202—204
30000	10	Do. do., 3rd do. .	all	5 0 0	19¼—19⅞
50000	10	Do. do., 4th do. .	4 0 0	5 0 0	6¼-6⅜ pm
50000	10	Do. do., 5th do. .	2 0 0	5 0 0	5⅛-6 pm
2000000*l.*	Sk.	Do. C 10 p.c. pref.	100 0 0	10 0 0	225—230
300000*l.*	,,	Do. D do. do. .	100 0 0	10 0 0	225—230
165000*l.*	,,	Do. E do. do. .	100 0 0	10 0 0	225—230
30000*l.*	,,	Do. F 5 do. do. .	100 0 0	5 0 0	..
60000*l.*	,,	Do. G 7½ do. do. .	100 0 0	7 10 0	160—165
1300000*l*	,,	Do. H	100 0 0	7 0 0	148—152
10000	20	*European* (Limited)	10 0 0	10 0 0	18¼—19¼
12000	10	Do., new shares.	7 10 0	10 0 0	5¼—6 p.
35406	10	Do., new shares .	5 0 0	10 0 0	5¼—5¾ p.
6200	5	Georgetown, Guiana	5 0 0	5 0 0	..
5600	10	Hong Kong (Lim.)	10 8 0	10 0 0	15—16
56000	50	*Imprl. Continental*	43 15 0	9 10 0	87—89
378350*l.*	Sk.	*London*	100 0 0	10 0 0	215—220
150000*l.*	Sk.	Do., 1st pref. . .	100 0 0	6 0 0	138—141
14450	Sk.	Do., 2nd pref. . .	100 0 0	6 0 0	..
4350	Sk.	Do., 3rd pref. . .	100 0 0	6 0 0	..
7622	25	Do., A shares . .	12 10 0	6 0 0	33—34
268051*l.*	All	Do., Debent. stk.	100 0 0	*5l.* & *6l.*	8-10 pm.
15000	5	Malta and Mediterranean (Limited).	5 0 0	2 0 0	2—3
6000	5	Do., preference .	5 0 0	7 10 0	4¾—5¼
20000	5	Mauritius (Limited)	2 0 0	..	1—2
25000	20	Monte Video (Lim.)	20 0 0	8 0 0	17½—18
8000	10	Nictheroy, Brazil (Limited)	10 0 0	3 10 0	..
30000	5	Oriental (Calcutta).	5 0 0	9 10 0	8—8½
30000	5	Do., new shares .	3 0 0	9 10 0	2-2½ pm.
10000	5	Ottoman (Limited).	5 0 0	3 0 0	..
17500	10	Pará (Limited) . .	10 0 0	7 0 0	4—5
27000	20	*Phœniz*	20 0 0	10 0 0	41—43
3600000*l.*	100	Do., new	55 0 0	7 10 0	99—101
1440000*l.*	Sk.	Do., capitalized .	100 0 0	5 0 0	108—111
36000	20	Rio de Janeiro (L.)	20 0 0	10 0 0	32—34
7359	5	Singapore (Limited)	5 0 0	7 10 0	5¼—5⅝
2000	5	Do., preference .	5 0 0	7 10 0	5⅜—6¼
1500	32½	Shanghai	32 10 0	12 0 0	30—32
4000	50	*South Metropolitan*	50 0 0	10 0 0	107—109
4000	12½	Do.	12 10 0	10 0 0	26—28
20000	12½	Do., new shares .	9 0 0	10 0 0	11½—12½ pm.
15000	10	*Surrey Consumers.*	10 0 0	10 0 0	21—22
10000	10	Do., new	8 0 0	10 0 0	9-10 pm.
9000	4	Unit. Genl., Limrck.	4 0 0	2 10 0	2—2½
1500	10	*Wandsw. & Putney*	10 0 0	10 0 0	19—20
1500	10	Do.	10 0 0	7 10 0	11—12
2957	10	Do.	10 0 0	7 0 0	..
993	10	Do.	3 0 0	7 0 0	..
16000	5	*West Ham*	5 0 0	10 0 0	8—8⅛
10000	5	Do., new shares .	2 10 0	10 0 0	3—4
		WATER COMPANIES.			
12000	100	Chelsea	100 0 0	6 0 0	144—147
1800000	100	East London . . .	100 0 0	6 0 0	150—155
8000	50	Grand Junction . .	50 0 0	7 0 0	75—78
5840	25	Do., ¼ shares . .	25 0 0	7 0 0	38—38½
2160	25	Do., new ditto; max. div., 7½ p.c.	25 0 0	7 0 0	36½—37½
547960	100	Kent	100 0 0	8 0 0	175—180
970	100	Lambeth	100 0 0	6 5 0	144—148
1161	100	Do.	45 0 0	6 5 0	25-30 pm
442	100	New River	100 0 0	8 0 0	170—180
4475	100	Do.	30 0 0	8 0 0	50—55
400000	100	Do., deb. stk., 4 p.c.	100 0 0	4 0 0	97—99
3036	100	Southwrk. & Vauxh.	100 0 0	4 0 0	109—112
1296	100	Do., pref. stock .	100 0 0	5 0 0	111—113
..	100	Do., D shares . .	100 0 0	4 0 0	106—108
..	..	Do.	..	4 10 0	..
..	100	Do., new ordinary	..	4 10 0	..
1600	100	Do., new ord. No. 1	40 0 0	4 10 0	106—108
12172	61	West Middlesex . .	61 0 0	6*l.* p.sh.	135—138

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION has been AWARDED to

GWYNNE & BEALE'S PATENT IMPROVED GAS-EXHAUSTERS,

FIG. 224.

The BEST EXHAUSTERS IN THE WORLD.

GWYNNE & CO.
HAVE MADE THE
LARGEST AND MOST PERFECT
EXHAUSTING MACHINERY
Ever produced, and the most economical in working.

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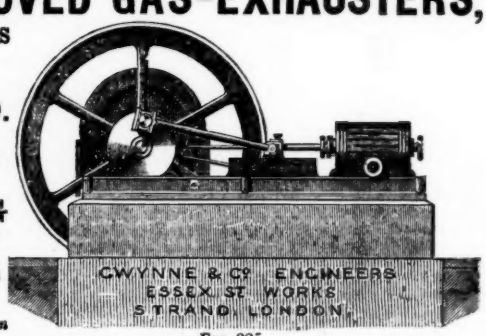

FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 62,500 cubic feet per hour. GWYNNE AND CO. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

REGULATORS, BYE-PASSES, STOP-VALVES, GAS-VALVES, & MACHINERY FOR GAS MANUFACTURE, OF ALL SIZES,
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MANUFACTURERS OF WET AND DRY GAS-METERS;
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ABOVE 30,000 OF WHICH ARE NOW IN USE.

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GAS-WORKS CLAUSES AMENDMENT ACT, 1871.

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FORMS OF ANNUAL ACCOUNTS, arranged as required by the 35th Section of the Act (34 & 35 Vict., cap. 41), are now ready.

These Forms have been printed on large sheets of paper of the best quality, and are carefully ruled so as to afford the utmost facility for compliance with the provisions of the Act.

Price 3s. 6d. per dozen, free by post, or may be ordered of any Bookseller.

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A Specimen Sheet on receipt of Six postage stamps.

TWELVE Gasholder Columns for Sale, cheap and good, about 30 ft. high by 2 ft. diameter at base, 1 ft. 6 in. at cap. Moulded caps and bases, guide-rails, and brackets complete. Suitable for gasholder 80 ft. to 100 ft. diameter.

Apply to Mr. JAMES HALL, Manager, Gas-Works, St. Helen's, LANCASHIRE.

WANTED, a situation as Gas Manager. Address ALPHA, 45, Arthur Street, RYDE.

WANTED, in a large Provincial Gas-Works, a thoroughly good hand as SERVICE LAYER and METER INSPECTOR. Situation permanent.

Address, stating every particular, No. 307, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a competent Man, a situation as Meter Fixer, Index Reader, or Service Layer. Also has a knowledge of interior fitting. Good references and experience.

Address A. B., 15, Charlotte Street, WEST GREENWICH.

WANTED, a situation as Manager in a Gas-Works. Has had many years experience in the erection and management of Gas-Works, and every reference as to character and ability given. Married. Aged 44.

Address WILLIAM SIVITER, Gas Manager, Aberystwith, WALES.

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COOKING AND HEATING.

HINTS ON GAS BURNERS, &c.

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STOKER Wanted, a good Carbonizer, for small Gas-Works near London.

Forward particulars of age and salary required, with copies of testimonials, to H. SKEINES, Argyle Street, King's Cross, LONDON, W.C.

WANTED, a first-class Man as Foreman of Retort-Setters. Must have had considerable experience in large works.

Address, stating wages required and references, No. 306, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by the Hindley Local Board, a practical Man to MANAGE their Gas-Works. Annual make about 23 millions. He will be required to reside on the premises. House, rent, fire, and gas provided.

Applications to state salary required, with recent testimonials, and to be sent to the Chairman, Richard Pennington, jun., Esq., Hindley Lodge, Hindley, on or before Thursday, Oct. 5, 1876, endorsed "Application for Gas Manager."

By order,
STEPHEN HOLT, Clerk to the Local Board.
Offices, Cross Street, Hindley, Sept. 20, 1876.

FOR SALE—Six dozen 2-in. Iron Tubes, 6 ft. long.

Apply at the Gas-Works, Somersham, St. Ives, HUNTS.

ON SALE—One square Station-Meter, made by West in 1866, to register 8000 feet per hour, with 8-in. valves, bye-pass, &c., now in use and in good condition.

Apply to J. AND J. BRADDOCK, Globe Meter-Works, OLDHAM.

CONTRACTS.

TO CONTRACTORS.

THE Over Darwen Local Board of Health are desirous of receiving TENDERS for the necessary excavations and construction of GASHOLDER-TANK and Retaining Wall.

Plans and specifications may be seen, and full particulars obtained, on application to Mr. John Marsland, Engineer and Manager.

Sealed tenders, endorsed "Tender for Tank," must be sent to me, the undersigned, not later than Friday, the 20th day of October, 1876.

The Board do not bind themselves to accept the lowest or any tender.

CHAS. COSTEKER,
Law-Clerk to the said Board.
Over Darwen, Sept. 27, 1876.

TO GASHOLDER MAKERS, &c.

THE Over Darwen Local Board of Health are desirous of receiving TENDERS for the construction and erection of a Telescopic GASHOLDER, 100 ft. diameter and 22 ft. deep, with guide, framing, &c., complete.

Plans and specifications may be seen, and all particulars obtained, on application to Mr. John Marsland, Engineer and Manager.

Sealed tenders, endorsed "Tender for Gasholder," to be sent to me, the undersigned, not later than Friday, the 20th day of October, 1876.

The Board do not bind themselves to accept the lowest or any tender.

CHAS. COSTEKER,
Law-Clerk to the said Board.
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Tables, Rules, and Useful Information for Gas Engineers, Managers,
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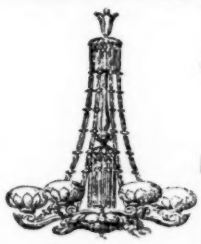

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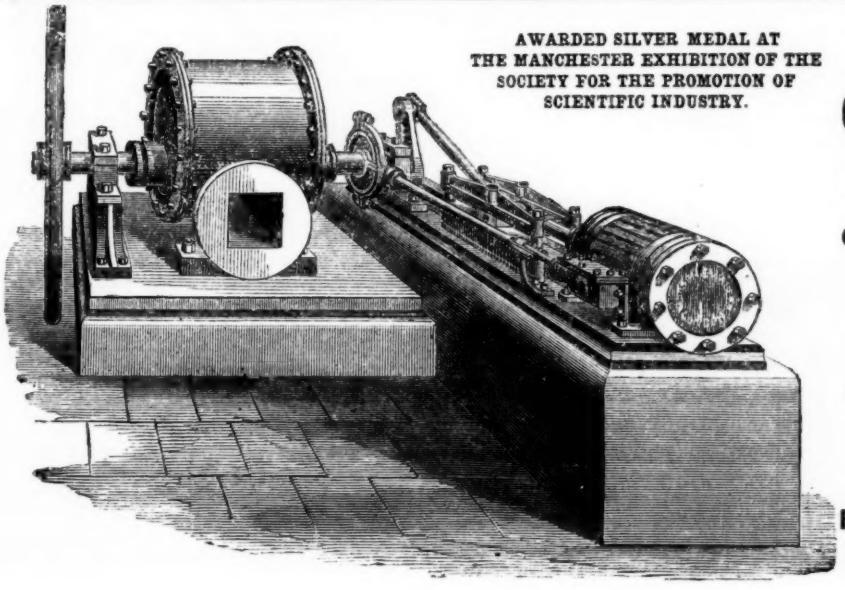

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CONDENSERS, BOILERS, &c.

PHŒNIX ENGINEERING WORKS,
HOLLAND STREET, S.E.,
AND
STROUD, GLOUCESTERSHIRE.

COMMERCIAL GAS COMPANY.

INCORPORATED 1847.

NOTICE is hereby given that the next ORDINARY MEETING of the Commercial Gas Company will be holden at the Cannon Street Hotel, in the City of London, on FRIDAY, the 6th of October, 1876, at Twelve o'clock at noon, to receive the Report of the Directors, to declare a Dividend, and for other business of the Company.

The Books will be closed for the transfer of Stock from the 22nd of September to the 6th of October next.

By order of the Board,

EDWARD J. SOUTHWELL, Secretary.

Offices, Stepney, Sept. 8, 1876.

THE Swansea Gaslight Company have for immediate SALE, the following Plant:—

A 6-h.p. Patent Trunk Engine. (Beale.)

Cylindrical Egg-ended Boiler, 20 ft. by 4 ft. 6 in. (Beale.)

Exhauster to pass 15,000 feet per hour. (Beale.)

An 8-h.p. Grasshopper Engine. (Easton and Amos.)

Cylindrical Egg-ended Boiler, 20 ft. by 4 ft. 6 in. (Easton and Amos.)

Exhauster, 20,000 ft. per hour. (Beale.)

Tar, Liquor, and Water Pumps, Eccentrics, Shafting, and Driving Pulleys.

Wrought-iron Condenser, six vertical Legs, 30 ft. high, 24 in. by 6 in., with tar-boxes, dips, and syphons.

Wrought-iron Scrubber, 5 ft. diameter, 20 ft. high.

Cast-iron Scrubber, 3 ft. diameter, 20 ft. high.

A set of four cast-iron Purifiers, 12 ft. square by 5 ft. deep, with galvanized wrought-iron covers, lifting apparatus, four tiers of wooden sieves, 10-in. connexions and valves.

May be seen at the Gas-Works, Swansea. The whole in perfect working order; replaced by plant of larger dimensions.

Further particulars may be obtained on application to Mr. THORNTON ANDREWS, SWANSEA.

CONNAH'S QUAY GAS AND WATER COMPANY, LIMITED, NORTH WALES.

THE above Company are prepared to receive TENDERS for the erection of GAS-WORKS at Connah's Quay, North Wales.

CONTRACT No. 1.—Erection of Manager's House, Coal Stores, Retort-House, Purifier-Shed, and other Buildings.

CONTRACT No. 2.—The Excavation, Brickwork, &c., of a Gasholder-Tank.

CONTRACT No. 3.—All Ironwork, Retorts, Fittings, Hydraulic Main, Condensers, Washer, Purifier, Gasholder, &c., and all connecting-pipes and valves.

CONTRACT No. 4.—Comprises Cast-Iron Pipes, turned and bored; 1000 yards each 5 in. and 3 in., 500 yards 2 in., for gas; 1300 yards 6 in., 700 4 in., 2100 3 in., 550 2 in., for water.

Plans and specifications may be inspected at the Office of the Company, and any further particulars from Mr. J. T. HALL, Engineer, Prescot.

Tenders to be sent to the Secretary of the Company, 4, Cable Street, LIVERPOOL, not later than the 19th of October.

The Directors do not bind themselves to accept the lowest or any tender.

BY ORDER.

Liverpool, Sept. 25, 1876.

T. NEWBIGGING,

CONSULTING GAS ENGINEER,

5, NORFOLK STREET, MANCHESTER.

HENRY LYON,

ENGINEER,

AND

CONSULTING GAS ENGINEER,

BROOKLYN, CHEETHAM HILL ROAD,

MANCHESTER.

Mr. ALFRED LASS.

30, GRACECHURCH STREET, LONDON, E.C.,

Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.

To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.

To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

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(Successors to LYNCH WHITE,)

SUPPLY FROM STOCK

CAST-IRON RETORTS, SOCKET-PIPES for GAS or WATER PURPOSES, FLANGE-PIPES for STEAM, RAIN-WATER PIPES and GUTTERS, HOT-WATER PIPES and BOILERS, and all requisite Connexions for same; also LAMP-COLUMNS, LAMPS, WROUGHT FRAMES, WROUGHT-IRON TUBING, &c., &c.

All kinds of Gas-Works Apparatus and General Castings made to Pattern or Drawing.

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ATLAS METER-WORKS, OLDHAM,

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WET AND DRY GAS-METERS,

STATION-METERS, GOVERNORS,

PRESSURE AND EXHAUST REGISTERS,

LAMP-METERS IN CAST-IRON BOXES,

And every Description of Gas Apparatus.

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DIBDALE FIRE-CLAY, BRICK, AND GAS-RETORT WORKS,

STOURBRIDGE (Established 1834),

MANUFACTURER OF EVERY DESCRIPTION OF

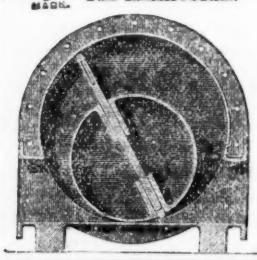
Burs, Lumps, Stays, Shields & other Bricks, & Gas-Retorts,

A LARGE QUANTITY OF RETORTS ALWAYS IN STOCK.

Circular .	14 in.,	15 in.,	16 in.,	18 in.
Ovals . .	17 in. × 14 in.,	17 in. × 15 in.,	20 in. × 15 in.,	21 in. × 15 in., &c.
D's. . .	14 in. × 14 in.,	15 in. × 12 in.,	15 in. × 13 in.,	17 in. × 14 in., 18 in. × 13 in.
	18 in. × 15 in.,	20 in. × 16 in.,	22 in. × 14 in.,	24 in. × 14 in., 24 in. × 15 in., &c.

Special attention given to the execution of Export Orders.

J. BEALE'S PATENT GAS EXHAUSTER.



BEALE'S CONTINUOUSLY ACTING

GAS EXHAUSTERS

ARE NOW MANUFACTURED BY

B. DONKIN & CO.

MR. J. BEALE, of East Greenwich, having retired from business, has made an arrangement with B. DONKIN & CO. for the sole manufacture of his Patent Solid-Slide Gas Exhausters.

B. D. & Co. also make Steam-Engines to drive Gas Exhausters direct or otherwise, and Gas-Valves.

Estimates and Prices on application to

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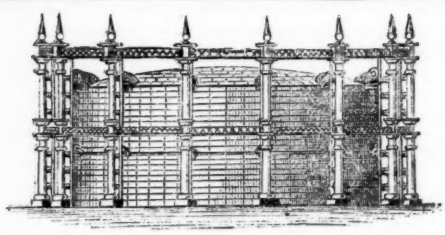
ENGINEERS & IRONFOUNDERS,

55a, BLUE ANCHOR ROAD, BERMONDSEY,

LONDON, S.E.

HOPE IRON WORKS,



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GAS ENGINEERS & CONTRACTORS,

MANUFACTURERS OF GASHOLDERS,

GAS APPARATUS OF EVERY DESCRIPTION,

Including Improved

Retort-Lids, Boilers, Cast and Wrought Iron Tanks, Iron Roofing, Bridges, Girders,

And GENERAL IRONWORK.

N.B.—Estimates for all Gas Plant and Remodelling supplied on application.

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GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

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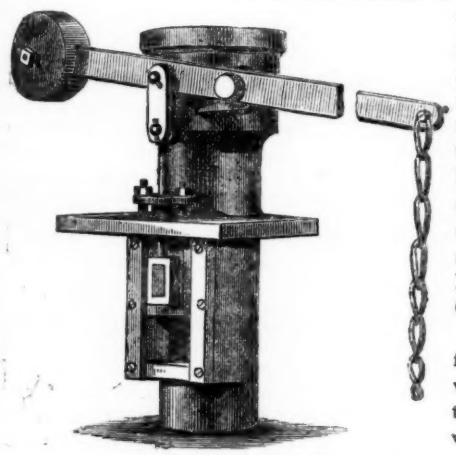
NEWGATE STREET, LONDON.

Meter Works in London—2, CROSS STREET, WILDERNESS ROW, E.C.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.

MOORE'S PATENT DIP-PIPE.



THE advantages of this Dip will be seen from the engraving. It is thoroughly effectual in its working, removing the whole of the pressure of the hydraulic main from the retort, thus causing a great saving in gas. It is very easy of manipulation, requiring little care and attention; it cannot get out of order, and, when shut, works as an ordinary Dip-Pipe. No accumulation of carbon in retort. Can be fixed to existing H-pipes.

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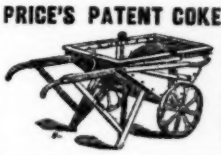

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For Repairing Gas-Retorts in Action, preventing Porosity, and reducing the Deposit of Carbon, is highly commended.

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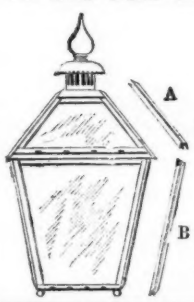

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OF THE HIGHEST EXCELLENCE,

Warranted to measure correctly, and not to vary.

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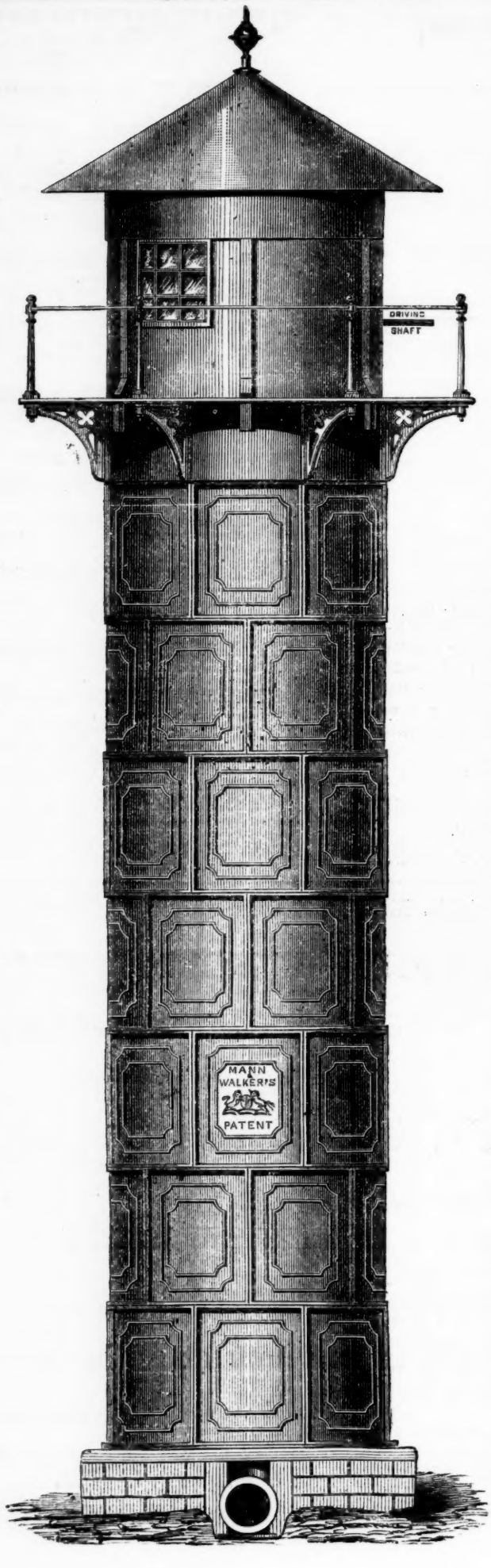

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MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the im-portant results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

They are, in all cases, constructed under guarantees to perfectly perform their work. They are now extensively used in the largest gas-works of London and the chief cities of Europe, the number in use exceeds **one hundred,** and their perfect efficiency and profit to a gas company have been fully established with every variety of coal used in Europe. References can be given to the largest gas-works in Europe.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, re-quiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

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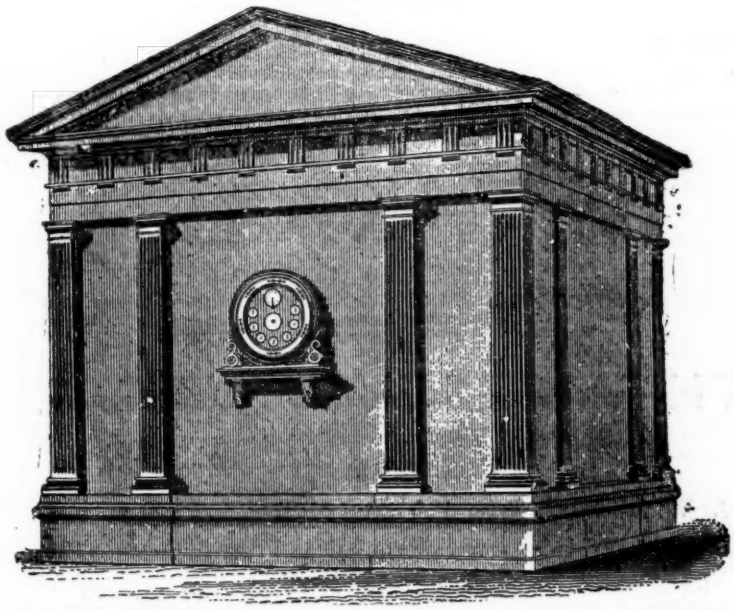
ROUND STATION-METERS,

ON CAST-IRON STANDS.



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FUEL-MACHINE, for Compressing Breeze and Tar.

WASHERS, SCRUBBERS, and PURIFIERS, that Economize Space and Cost.

N.B.—Pamphlet, with Eighteen Illustrations of the foregoing, with letterpress on the construction of Gas-Works, post free, 2s. 6d.

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In consequence of Mr. WILLIAM ROMANS having accepted the appointment of Engineer-in-Chief to the Sheffield Gas Company, the firm of J. and W. Romans, Gas Engineers and Coal Factors, is dissolved, and Mr. John Romans, C.E., F.G.S.E., is again Sole Proprietor.

Mr. Romans, in resuming the direction of this old-established business, desires to embrace the opportunity of inviting the attention of Corporations and Gas Companies to the great importance of a skilful selection of the Cannel and Coal to be carbonized. It is a fact known to those who have patiently manipulated the distillation of gas from Cannel and other Coals, with a view to obtain the highest economic results, that by a judicious intermixture of the lighter with the heavier gases, much of the rich hydrocarbons are saved, which otherwise would be lost during the process of manufacture.

It is with the experience of over 30 years continuous observation to this essential branch of science that Mr. Romans ventures to place at the disposal of his friends, Corporations, and Gas Companies at home and abroad, the practical knowledge he has thus acquired in the basis of gas manufacture and its residual products. Also upon all matters appertaining to the mechanical department of Gas-Works, he is, as a bred engineer, prepared to advise or contract for the supply or repair of the apparatus, or overlook and attest its construction for exportation.

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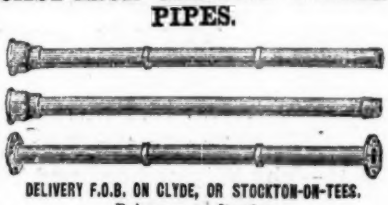

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Yields 13,320 cubic feet of 32·5-candle gas per ton.

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Beg leave to call the attention of Gas Companies to the superior quality of their

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This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.

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PREVENTS WASTE OF GAS FROM RETORTS;

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GREATLY ECONOMIZES THE USE OF FIRE-BRICKS;

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POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

HEBBURN MAIN GAS COALS.

Cubic feet of Gas yielded per ton	10,050
Illuminating power in sperm candles . .	15·4
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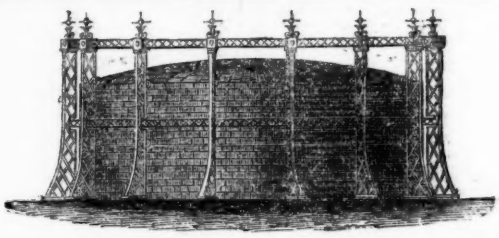

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Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

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REAL OLD SILKSTONE GAS COAL.

JAMES PATERSON, Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

ALBERT GAS COAL.

THE DERBYSHIRE

SILKSTONE COAL COMPANY,

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CAN OFFER A

GAS COAL

Of superior quality, delivered at any station in England and Wales.

Purified gas per ton of coal in cubic feet (average)	10,775
Weight of coke in lbs. per ton of coal	1,465

ANALYSIS AND PRICES ON APPLICATION TO

Mr. EDMUND TAYLOR, Secretary,

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MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS AND COLLIERIES,

NEAR SHEFFIELD,

STRONGLY RECOMMEND A TRIAL OF THEIR

CELEBRATED SILKSTONE GAS NUTS.

Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

APPLICATIONS FOR PRICES, &c., TO BE SENT DIRECT TO THE COLLIERY, AS ABOVE.

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FIRE GOODS, and Salt-Glazed Drain-Pipes.

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NEW PATENT WET GAS-METER,

THE "RELIANCE,"

MANUFACTURED BY THE

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The object attained by this invention is the *correct measurement of Gas under every fluctuation of the pressure.*

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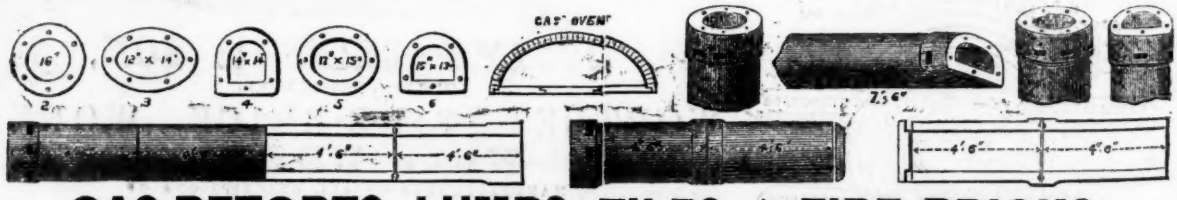

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